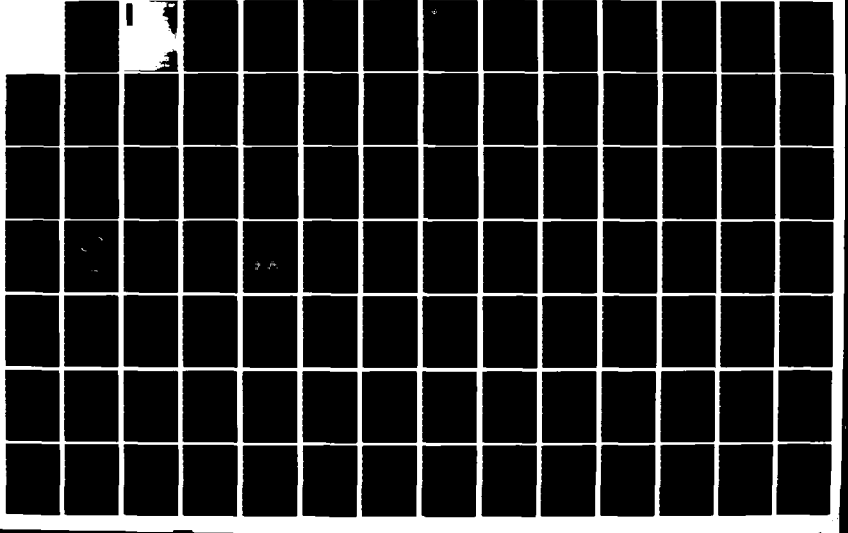
AD-A131 292 UNIT REPLACEMENT SYSTEM ANALYSIS I (URSA I)(U) ARMY CONCEPTS ANALYSIS AGENCY BETHESDA MD D R HOLDSWORTH ET AL. JAN 82 CAA-SR-82-1 1/3

UNCLASSIFIED F/G 5/9 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DISCLAIMER

The findings of this report are not to be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation. Comments or suggestions should be addressed to:

Commander
US Army Concepts Analysis Agency
ATTN: Director of Requirements
8120 Woodmont Avenue
Bethesda, MD 20814

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CAA-SR-82-1	2. GOVT ACCESSION NO. AD-A131292	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Unit Replacement System Analysis I (URSA I)		5. TYPE OF REPORT & PERIOD COVERED Final Study Report
		6. PERFORMING ORG. REPORT NUMBER CAA-SR-82-1
7. AUTHOR(s) LTC David R. Holdsworth MAJ Stephen C. Rinehart		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army Concepts Analysis Agency 8120 Woodmont Avenue (ATTN: CSCA-RQ) Bethesda, Maryland 20814		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Office of the Deputy Chief of Staff for Personnel Department of the Army, ATTN: DAPE-ZXB Washington, DC 20310		12. REPORT DATE January 1982 13. NUMBER OF PAGES 212
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Approved for public release; distribution unlimited.

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Active Army; Personnel; Management; Policy Evaluation; Unit Replacement; Unit Rotation; Costs; Net Assessment; Statistical; Simulation

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The URSA I Study consists of an analysis of the steady state conditions, the feasibility and the sustainability of a peacetime unit rotation system (URS) within the framework of a regimental umbrella. Using a combination of manual techniques and an automatic data processing (ADP) simulation, the study addresses the impact on Department of the Army (DA) management of supporting the URS concept in the areas of: (1) Personnel policies and procedures; (2) Distribution of manpower resources; (3) Major dollar resource implications; and (4) a brigade-size contingency mission.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

CAA-SR-82-1

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

The study analyzes the URS concept (i.e., units replacing units vice individuals replacing individuals) in the context of a 6-year model whereby a unit spends 3 years in CONUS and 3 years OCONUS with specified rotation times, individual fill periods, careerist movement periods, and collective training periods. The concept is analyzed in terms of the steady state requirements for unit grouping (or pairing), career management field (CMF) grade structuring, recruit requirements and distribution patterns, reenlistment requirements, homebasing, and extra-regimental assignments. A parametric analysis of a stylized mechanized Infantry Regiment is presented as a base case and is representative of the analysis of the other stylized Infantry, Armor, and Artillery Regiments. Finally, a detailed analysis of URS requirements for CMF's 11, 19 and 13 is presented with attention given to force structure and system fill requirements, individual movement, unit stability, and system costs.

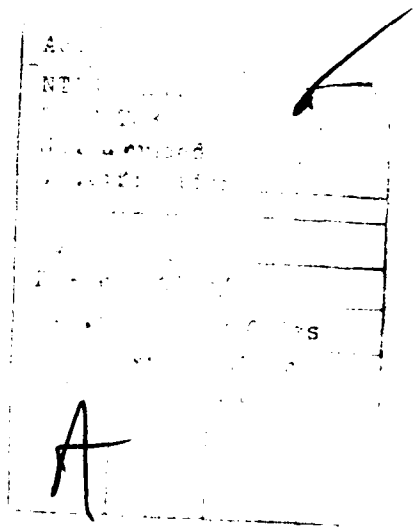
SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

STUDY REPORT
CAA-SR-82-1

UNIT REPLACEMENT SYSTEM ANALYSIS I

(URSA I)

January 1982



Prepared by

Requirements Directorate

US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland 20814

DEPARTMENT OF THE ARMY
US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20014

REPLY TO ATTENTION OF:

CSCA-RQP

26 January 1982

SUBJECT: Unit Replacement System Analysis (URSA) Study

Deputy Chief of Staff for Personnel
Department of the Army
ATTN: DAPE-MB
Washington, D.C. 20310

1. References:

a. Letter, DAPE-ZXB, 4 June 1981, subject as above.

b. Letter, DAPE-ZXB, 19 October 1981, subject: Revision to Study - Unit Replacement System Analysis (URSA).

2. Letter, reference a, as revised by reference b, directed the US Army Concepts Analysis Agency (CAA) to provide a study report on the analysis of a unit replacement system by 29 January 1982.

3. Attached is the final report which documents the analysis of a battalion rotation system which could operate within the framework of the regimental and homebase concepts.

4. This Agency expresses appreciation to all commands and agencies who have contributed to this product. Questions and/or inquiries should be directed to the Chief, Personnel, Logistics, and Resource Analysis Group (ATTN: CSCA-RQP), Requirements Directorate, US Army Concepts Analysis Agency, 8120 Woodmont Avenue, Bethesda, Maryland 20814 (Telephone: 202-295-5251).

1 Incl
as

EDWARD B. ATKESON
Major General, USA
Commanding

SUMMARY

1. STUDY PURPOSE. The purpose of the Unit Replacement System Analysis I (URSA I) Study is to assist the Department of the Army (DA) by developing the methodology and associated automated data processing (ADP) models and performing an analysis of the "steady state" of a unit replacement/rotation system operating within a regimental system. This analysis will yield information on major Army policies, systems, and resources with which Army managers can make decisions affecting the feasibility of the unit replacement/rotation system.

2. BACKGROUND. The Army Cohesion and Stability (ARCOST) Study, May 1980, concluded that the current individual replacement system creates excessive turbulence. It recommended that the Army begin a unit replacement system as an alternative. In July of 1980, the Chief of Staff, Army (CSA) tasked the Deputy Chief of Staff, Operations and Plans (DCSOPS) to begin a process leading to an evaluation of the unit replacement system on a small scale. During this process it became evident that insights were needed into the eventual steady state condition of the unit rotation/replacement system. On 13 March 1981, the US Army Concepts Analysis Agency (CAA) was formally tasked to conduct an analysis of the steady state condition of a unit rotation/replacement system.

3. OBJECTIVES. The objectives of the study are listed below:

a. Develop a model by which to analyze, in the steady state, the feasibility and sustainability of a peacetime unit replacement/rotation system within the framework of a regimental umbrella. This model must be so documented as to allow the study sponsor to continue follow-on analyses.

b. Identify the impact on DA management of a steady state unit replacement/rotation system in the areas of:

(1) Personnel policies and procedures.

(2) Distribution of Training and Doctrine Command (TRADOC), Forces Command (FORSCOM), US Army Recruiting Command (USAREC), and OCONUS resources.

c. Identify major resource implications (manpower and dollar) associated with the steady state unit replacement/rotation system.

d. Within the framework of the steady state system model developed, examine the impact of deploying a brigade-size CONUS force on a contingency mission.

e. Provide to the study sponsor emerging insights in the following areas:

(1) Necessary and/or recommended changes to the replacement/rotation concept under analysis to improve feasibility and sustainability, improve unit operational effectiveness, reduce cost, or reduce significant adverse impacts.

(2) Long lead time major actions required to implement the concept.

(3) Significant results on any of the EEA.

4. ASSUMPTIONS. The assumptions stated in the study directive (Appendix B), as revised, are listed below:

a. The US Army Recruiting Command (USAREC) can recruit sufficient personnel for the military occupational specialties (MOS) required to support a unit replacement/rotation system.

b. Facilities will exist to support a unit replacement/rotation system.

c. Current promotion and attrition rates will apply.

d. Grade substitution (to next higher grade) will be permitted during unit pre- and postdeployment fill periods.

e. Grade substitution (one up/one back) will be permitted during the stabilization periods to minimize turbulence.

f. The number of OCONUS units subject to replacement/rotation, by type Table of Organization and Equipment (TOE), will not exceed the number currently envisioned being stationed OCONUS under Army 86/Division 86.

g. Conversion to Army 86/Division 86 will not change the by-grade and MOS end strength of the Army.

h. Legislation will exist to allow variable enlistment periods. All first-term enlistment periods will be equal to 36 months plus the MOS-peculiar initial entry training (IET) period.

i. The Active Components of Army 86 will remain a total "volunteer" Army.

j. The by-grade and MOS authorizations for Tables of Distribution and Allowances (TDA) positions, positions in TOE echelons above battalion (EAB) and positions in separate TOE units of smaller than battalion-equivalent size will remain the same for the steady state as they are

reflected in the Army Authorization Document System (TAADS)[3] as of 2 July 1981.

5. METHODOLOGY. The study was conducted in four phases as depicted in Figure 1. During the first phase, background information was collected and analyzed to formulate the modeling techniques for analysis of the regimental concept presented by the study sponsor. During the second phase an analytic model was designed and tested, macroanalyses of the regimental concept were completed, and a stylized mechanized infantry (MX) regiment was refined. This MX regiment was further subjected to a parametric analysis of policy modifications (as described in Chapter 5) to provide emerging conceptual insights and provide the basis for study sponsor guidance on a final MX regimental structure, the replacement/rotational concept, and the structures of the remaining combat arms stylized regiments. During Phase III, extensive use was made of the refinements both to the analytic model and to the regimental concept in modeling and analyzing the other combat arms regiments. This phase concluded with the development of findings and observations concerning the steady state analysis and emerging insights regarding the regimental concept and transition to the steady state conditions. During Phase IV the study report was written and forwarded to the Manning Task Force for use in implementation planning.

6. MODELING

a. An objective of the study was to develop a model by which to analyze, in the steady state, the feasibility and sustainability of a peacetime unit replacement/rotation system. The model was to be available to allow the study sponsor to conduct follow-on analyses. Due to its size and complexity, it will remain at CAA. Currently a follow-on analysis (URSA II) is being conducted by CAA.

b. Figure 2 depicts the complete modeling methodology. The Unit Replacement/Rotation System Analysis Model (URSAM) is the aggregate of four submodels: the Personnel Evaluation Model (PERSEM), the Regimental Personnel Flow Model (RPFM), the Force Cost (FORCOST) Model, and the Regimental Statistical Analysis Model (RSAM). The URSAM is designed to produce relevant measures of effectiveness and cost (MOE/MOC) based upon the simulation of a stylized regiment over a period of time sufficient to ensure the process is in steady state. To this end, the simulation model (RPFM) was initially set to run for 30 years before statistics necessary to the calculation of the MOE/MOC would be captured. The FORCOST Model and RSAM are, respectively, adaptations of the Army Force Cost Information System Model and the commercially procured Statistical Package for the Social Sciences (SPSS). Both models were designed to provide relatively quick calculations of one-time and recurring MOE/MOC. (Some of the MOE initially produced by RSAM were eventually reprogramed as output directly from RPFM.) The PERSEM was run separately to perform a macroanalysis of the sustainable personnel structure resulting from input rates of promotion, reenlistment, and attrition. All programing

of the component models was done by the members of the study team, with the exception of FORCOST, which had been previously developed at CAA. URSAM was designed from the beginning to be generalized, thereby allowing the analysis of a wide range of replacement/rotation concepts. Consequently, the model has several features, such as alternative methods of calculating first-term group (FTG) fill levels, that have not been needed in production runs to date.

7. RESULTS. The study results did not indicate any condition which would preclude implementation of the rotation concept. Personnel stability in rotating battalions is significantly increased and most of the turnover occurs at scheduled times. Figure 3 depicts the turnover in a typical rotating battalion. During the FTG fill periods ("Fill" in Figure 3), a block of new FTG personnel joins the battalion. Additionally, FTG personnel who have been in the battalion for 3 years either reenlist and remain in the battalion as careerists or do not reenlist and leave the Army. During the careerist assignment periods (Opt in Figure 3), careerists eligible to leave the unit can be assigned out of the battalion and others can be assigned to the unit. Careerists assigned to the batttalion also either reenlist and remain in the battalion or do not reenlist and leave the Army. The battalion is located OCONUS during months 13 through 24.

8. SIGNIFICANT OBSERVATIONS. The purpose of this paragraph is to summarize the significant observations of this study. Further detail is located in Chapters 4 and 8. These observations are presented in the following paragraphs:

a. Battalion Participation. The amount of battalion participation in unit rotation depends on the requirements of the rotation patterns, the number of available battalions, their location (CONUS/OCONUS), and their mission requirements. In this study, school support, national training center, and ranger missions were the only functions that prohibited units from rotating. Even with minimal mission limitations, 79 percent of the available battalions could participate in unit rotation under the requirements of the basic concept.

b. Requirement for Individual Replacement. Although the emphasis in unit rotation is on people moving with the rotating battalions, there is still a significant requirement for assignments on an individual basis. These include assignments to and from TDA and EAB positions as well as to nonrotating battalions. The results of the study indicate that typically one-fourth to one-third of the total personnel movements were individual replacement actions.

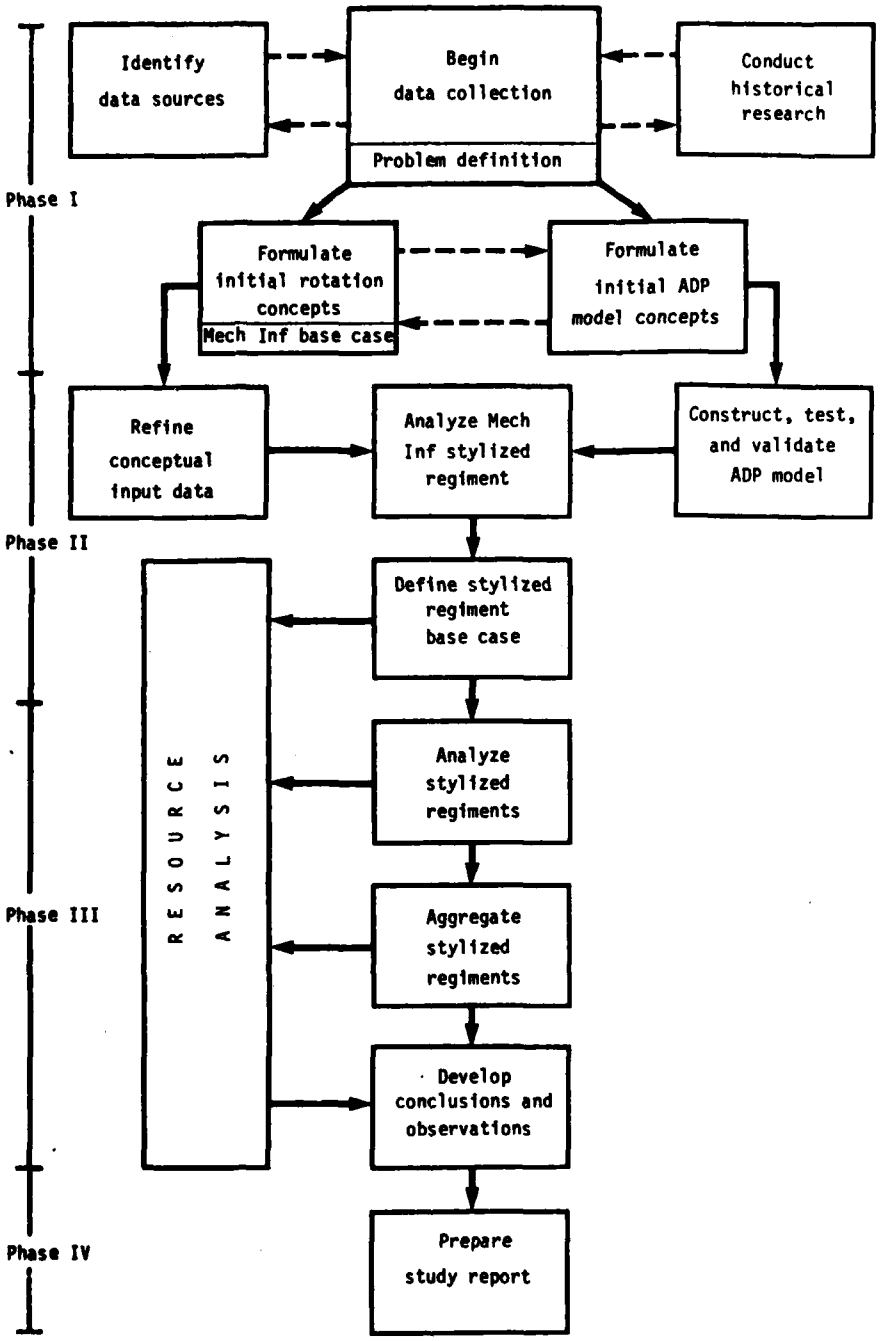


Figure 1. Study Methodology

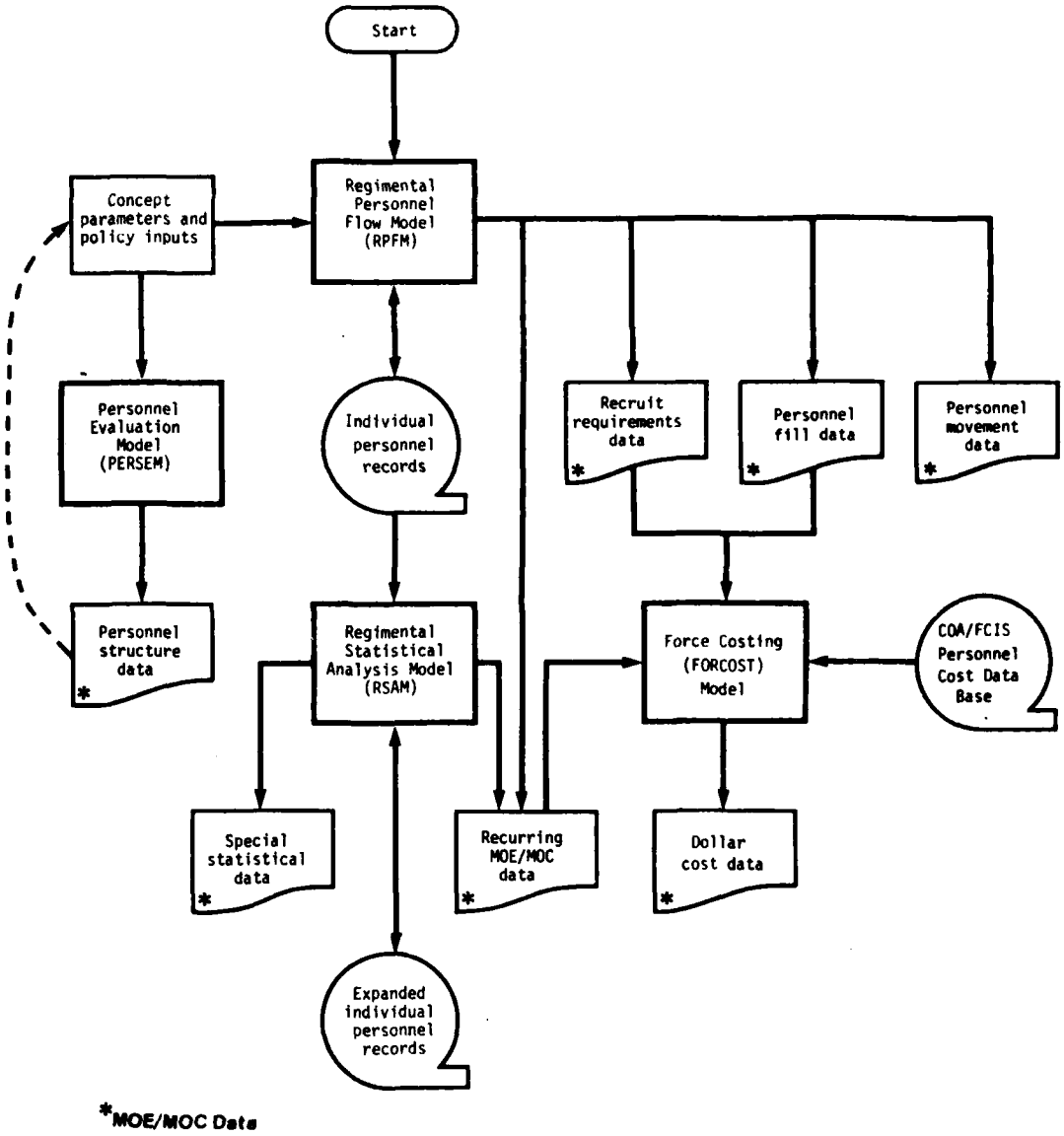


Figure 2. Modeling Methodology

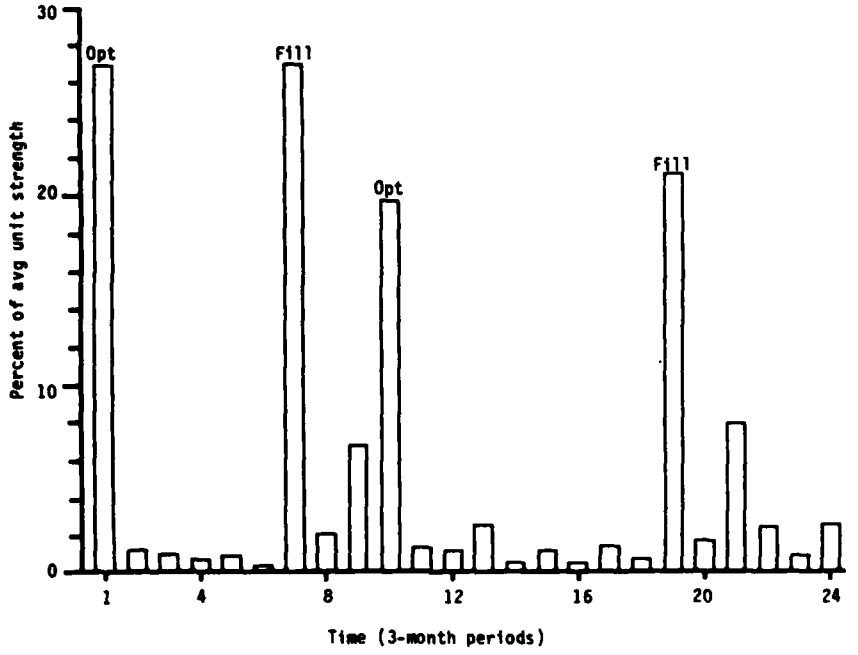


Figure 3. Percent Turnover per Quarter in a Typical Rotating Battalion

c. CONUS EXTRAREGIMENTAL ASSIGNMENT (ERA) Turnover. The unit rotation concept partitions assignments into rotating battalion assignments, CONUS ERA, and all other assignments. The CONUS ERA acts as the focal point for all individual replacement actions to and from the rotating battalions and all other assignments. This results in CONUS ERA turnover rates of approximately twice those in the rotating battalions.

d. Manning Levels. Under an individual replacement system, FTG personnel enter the unit on an as needed basis. If the unit strength is maintained at the minimum level, the average unit strength using individual replacement will equal that minimum strength level. Under the unit rotation concept, FTG personnel are periodically input as a group (block fill). To keep the unit strength above a minimum level, FTG fill must account for anticipated attrition. This results in an average manning level greater than the required minimum. The study results show that the average manning level for battalions receiving FTG block fill was approximately 20 percent higher than the minimum requirement. A corresponding increase in recruits will be needed to support this higher manning requirement.

e. Battalion Strength Fluctuations. The requirement for the block fill of the FTG replacements to rotating battalions causes substantial fluctuations in the strength of these battalions. The magnitude of the fluctuations depends on the time between fills and the anticipated personnel attrition rates. The study results indicate that, this magnitude will be approximately 40 percent for rotating battalions.

f. Careerist Movement During the FTG Fill. Careerists are not allowed to be reassigned from or into a rotating battalion during the battalion's FTG fill period. Consequently, any excesses of careerists caused by the input of FTG cannot be reassigned until the rotating battalion's subsequent careerist assignment window. Study results show these excesses to be significant (especially of E-4/E-5 careerists). Many of these could have been reassigned out of the rotating battalion at the time of the FTG fill without adversely impacting the total strength of the rotating battalion.

g. Cost. Although the number of permanent change of station (PCS) reassignments increased under unit rotation, the PCS cost comprises only 5 percent of the total personnel costs for a regiment. Consequently, even major PCS cost changes have a minimal impact on total system cost comparisons. The personnel manning level required to support/sustain the rotational concept is the major contributor to any cost differences. To the extent that FTG block fill, as used in the unit rotation concept, results in an increased manning level (compared to individual replacement), total costs under unit rotation also will increase.

h. Contingency Operations. Contingency operations are normally a combined arms effort (infantry, armor, artillery, etc.); therefore, many regiments across several career management fields (CMF) could be affected. The total impact of a contingency operation depends on the size of the contingency force and the duration of the stay OCONUS. For short durations, the impact is localized to the deploying regiments, and reassignment actions may simply be postponed. For durations sufficiently long that further delays in scheduled unit/individual reassignments become impractical, the impact may be felt across the CMF(s). Unit rotations, at least in the regiments with deployed battalions, would require curtailment, and an individual replacement system supported by the remainder of the CMF would become necessary.

CONTENTS

FIGURES

FIGURE

FIGURE Page

FIGURE

TABLES

TABLE

UNIT REPLACEMENT SYSTEM ANALYSIS I (URSA I)

CHAPTER 1

INTRODUCTION

1-1. STUDY PURPOSE. The purpose of the study is to assist the Department of the Army (DA) by developing the methodology and associated automated data processing (ADP) models and performing an analysis of the "steady state" of a unit replacement/rotation system operating within a regimental system. This analysis will yield information on major Army policies, systems, and resources with which Army managers can make decisions affecting the feasibility of the unit replacement/rotation system.

1-2. DEFINITIONS. To ensure adequate understanding of the terminology and concepts presented in this and successive chapters, several key definitions are presented below:

a. Steady State. The steady state for a unit replacement/rotation system is the eventual condition which occurs, and can be sustained, after the start-up or transition phase is complete. The steady state is exemplified by a smooth rotation of units between continental United States (CONUS) and outside continental United States (OCONUS) stations supported by a personnel system which provides a sufficient supply of trained individuals.

b. Stabilization. Stability is keeping soldiers together in units longer. The stability of a soldier is measured by tenure in his unit rather than his tour length at a location. To achieve this goal, there will be a corresponding need for stabilization in manpower and the force structure.

c. Unit Rotation. The movement of units from a CONUS homebase to OCONUS and back. This may involve the rotation of battalions within which companies are periodically replenished with groups of first-termers, rotating companies, or smaller units. The concept envisions concurrent employment of the individual replacement system.

d. Unit Replacement. To disestablish a unit at the end of a tour and replace it with a newly deployed unit as opposed to rotating the old and new units.

e. Homebasing. This term conveys dual goals. All units in the regimental system will have a CONUS homebase which will also be the permanent location of the regimental colors. A corollary intent is to provide career soldiers a CONUS homebase to which they will be assigned whenever possible.

f. Regimental Affiliation. The continuous association or identification of a soldier with a single regiment, unit, or institution throughout his career.

1-3. BACKGROUND

a. The Chief of Staff, Army (CSA), concerned with the effects on Army operational effectiveness of turbulence, stability, and cohesion, directed the initiation of the Army Cohesion and Stability (ARCOST) Study in May 1980. The ARCOST Study concluded that the current individual replacement system creates excessive turbulence in units and inhibits unit cohesion and integrity. As a recommendation, the study suggested that the Army begin a unit replacement system on a small scale, increasing its scope as the Army learns how to support unit replacement.

b. Susbsequently, in July 1980, the CSA tasked the Department of the Army (DA), Deputy Chief of Staff for Operations and Plans (DCSOPS) to begin a process leading to evaluating a unit replacement system on a small scale. This led to a proposal presented 19 December 1980 to the CSA for a Company Replacement Package (C-REP) evaluation involving 19 companies over a 3-year period. At that C-REP briefing, there was considerable discussion about managing a company replacement system. In particular, it was affirmed that the Army should know what the end picture will look like before starting and should identify those management procedures which must be adopted to implement such a system. Visualizing the end picture, referred to as the steady state, became an important planning objective by which the Army can determine how to move from the C-REP evaluation of a small number of companies to an Army-wide replacement system.

c. On 13 March 1981, by letter, DACS-FM, subject: Study - Unit Replacement System Analysis (URSA), the US Army Concepts Analysis Agency (CAA) was tasked to conduct an analysis of a peacetime steady state unit replacement system, within the framework of a DA-approved regimental concept. This study directive resulted from the recognition that analysis of unit replacement in the steady state will provide such management insights.

d. On 30 March 1981, The Inspector General (TIG) presented the CSA with the results of a functional review of alternative personnel replacement systems. Within TIG's report was a recommendation to assign proponency for development of a new manning system to the Deputy Chief of Staff for Personnel (DCSPER).

e. On 20 April 1981, by HQDA letter 570-81-2, subject: Development of New Manning System, DA DCSPER was tasked to develop a new manning system that is primarily a unit replacement or rotation system which can be supplemented by an individual replacement system. That tasking included DCSPER's assuming the proponency for the CAA analytical efforts. In response to that tasking, the DA DCSPER established the Special

Assistant for Manning. As a result of the IG report and further consideration of the requirements for analysis of a unit replacement or rotation system, the study directive (Appendix B) was written and superseded the letter of 13 March 1981 (paragraph c, above). Further, it was recognized that necessary and sufficient conditions for feasibility and sustainability must first be established for a peacetime steady state system. This portion of the effort was tasked to CAA.

f. On 20 August 1981 an in-process review (IPR) of the New Manning System was held for the CSA. As a result of concerns expressed by major Army command (MACOM) commanders during the IPR, the scope of this study was changed to focus on the analysis of battalion-sized replacement/rotational units and additional detail was added to the essential elements of analysis (EEA).

1-4. PROBLEM. The current Army individual replacement system is turbulent; it does not promote cohesion and stability, and detracts from the unit operational effectiveness objective of maintaining trained personnel on equipment for the maximum period of time. Before adopting a unit replacement/rotation system, an evaluation of how such a system will work is needed.

1-5. OBJECTIVES

a. Develop a model by which to analyze, in the steady state, the feasibility and sustainability of a peacetime unit replacement/rotation system within the framework of a regimental umbrella. This model must be so documented as to allow the study sponsor to continue follow-on analyses.

b. Identify the impact on DA management of a steady state unit replacement/rotation system in the areas of:

(1) Personnel policies and procedures.

(2) Distribution of Training and Doctrine Command (TRADOC), Forces Command (FORSCOM), US Army Recruiting Command (USAREC), and OCONUS resources.

c. Identify major resource implications (manpower and dollar) associated with the steady state unit replacement/rotation system.

d. Within the framework of the steady state system model developed, examine the impact of deploying a brigade-size CONUS force on a contingency mission.

e. Provide to the study sponsor emerging insights in the following areas:

(1) Necessary and/or recommended changes to the replacement/rotation concept under analysis to improve feasibility and sustainability, improve unit operational effectiveness, reduce cost, or reduce significant adverse impacts.

(2) Long lead time major actions required to implement the concept.

(3) Significant results on any of the EEA.

1-6. SCOPE

a. The unit replacement/rotation system will be analyzed for peacetime conditions, within the framework of a regimental system. (The regimental system concept will be that as provided by the Manning System Task Force.)

b. Europe, Panama, Alaska, Hawaii, and Korea will be the OCONUS tours considered.

1-7. ASSUMPTIONS. The assumptions stated in the study directive (Appendix B), as revised, are listed below:

a. USAREC can recruit sufficient personnel for the military occupational specialties (MOS) required to support a unit replacement/rotation system.

b. Facilities will exist to support a unit replacement/rotation system.

c. Current promotion and attrition rates will apply.

d. Grade substitution (to next higher grade) will be permitted during unit pre- and postredeployment fill periods.

e. Grade substitution (one up/one back) will be permitted during the stabilization periods to minimize turbulence.

f. The number of OCONUS units subject to replacement/rotation, by type Table of Organization and Equipment (TOE), will not exceed the number currently envisioned being stationed OCONUS under Army 86/Division 86.

g. Conversion to Army 86/Division 86 will not change the by-grade and MOS or officer specialty end strength of the Army.

h. Legislation will exist to allow variable enlistment periods. All first-term enlistment periods will be equal to 36 months plus the MOS-peculiar initial entry training (IET) period.

i. The active components of Army 86 will remain a total "volunteer" Army.

j. The by-grade and MOS authorizations for Table of Distribution and Allowance (TDA) positions, positions in TOE echelons above battalion and positions in separate TOE units of smaller than battalion-equivalent size will remain the same for the steady state as they are reflected in The Army Authorization Document System (TAADS) as of 2 July 1981.

1-8. ESSENTIAL ELEMENTS OF ANALYSIS (EEA)

a. In order to achieve a steady state unit replacement system, what are the requirements for/or impact of:

(1) First-term enlistment period?

(2) Reenlistment period?

(3) OCONUS tour lengths for both units and individuals?

(4) CONUS tour lengths for both units and undividuals?

(5) Training period?

(6) Unit life cycle for replacement units/personnel packages?

(7) Unit rotation cycle for rotational units?

b. What is the impact of a unit replacement/rotation system on the parent unit in terms of training, logistics, and deployability?

c. Under a unit replacement/rotation system, what are the demands for individual replacements? How can these demands be satisfied?

d. Can the current sustaining base support a unit replacement/rotation system? What are the implications for FORSCOM? How does this affect the homebase concept?

e. What will be the implications of a unit replacement/rotation system for USAREC and TRADOC?

f. What will the personnel distribution formulae be at allowable points in the replacement/rotation cycle?

g. How do the dollar costs associated with a unit replacement/rotation system compare to the dollar costs of the current individual replacement systems, as would apply in the Army 86 structure?

h. What insights have been gained from the analysis of the steady state system which may assist in a transition from the current individual replacement system?

i. What is the relative impact of the following personnel policy modifications to the basic New Manning System (NMS) concept?

(1) Within a 6-year rotational unit tour, requiring careerists in the rotational units to serve at least 3 continuous years with the same unit as opposed to a requirement to serve at least 4 continuous years with the same unit.

(2) Force E-5 and below personnel in extraregimental assignments (ERA) who have never served in the regiment's rotational units, into one of the rotational units on subsequent assignments. Examine the following rates of such forced reassignment: 100 percent and 0 percent.

(3) Careerist opt-out points aligned with the first-term group (FTG) fill points for rotational units, as opposed to the base case concept of redeployment and predeployment careerist opt-out points in the CONUS unit tour period. (For battalion replacement, aligned fill and opt-out points are required and coincide with the first and last time step of the replacement cycle.)

(4) Block fill of FTG packages to the regiment's quota of ERA positions coincident with the FTG fill points to the regiment's rotational units, as opposed to allowing the FTG ERA positions to be filled whenever shortages occur, i.e., "trickle fill."

1-9. CONTENTS OF THE REPORT. Chapter 2 contains a discussion of the study methodology, analytical tools/methods, and quality assurance activities employed during the study. A detailed discussion of the unit rotation concept is presented in Chapter 3, followed by an analysis of the concept in Chapter 4. Chapters 5 and 6 present the analysis required for the establishment of base case "stylized" regiments, and in Chapter 7 this analysis is further detailed to the career management field (CMF) level for selected fields (CMF 11, 19, and 13). The final chapter presents the major findings of the study and addresses each of the EEA as stated in paragraph 1-8.

CHAPTER 2

STUDY METHODOLOGY

2-1. INTRODUCTION. This chapter describes the work flow and methodology of the URSA I Study, the analytic tools used, and the activities performed to assure the quality and reliability of the study.

2-2. EXECUTION OF THE STUDY METHODOLOGY

a. General. The study was conducted in four phases as depicted in Figure 2-1. During the first phase, background information was collected and analyzed to formulate the modeling techniques for analysis of the regimental concept presented by the study sponsor. During the second phase an analytic model was designed and tested, macroanalyses of the regimental concept were completed and a stylized mechanized infantry (MX) regiment was refined. This MX regiment was further subjected to a parametric analysis (as described in Chapter 5) to provide emerging conceptual insights and provide the basis for study sponsor guidance on a final MX regimental structure, the rotational/replacement concept, and the structures of the remaining combat arms stylized regiments. During Phase III, extensive use was made of the refinements to the analytic model and the regimental concept in modeling and analyzing the other combat arms regiments. This phase concluded with the development of findings and observations concerning the steady state analysis and emerging insights regarding the regimental concept and transition to the steady state conditions. During Phase IV the study report was written and forwarded to the Manning Task Force for use in implementation planning.

b. Phase I

(1) Identification of Data/System Sources. In Phase I it became evident that an analytic model was required to aid in analyzing the steady state conditions for a feasible and sustainable unit rotation/replacement system. The basic regimental concept modeled was ultimately that specified in the 12 June 1981 Manning Task Force Concept Paper.[1] Principal data sources for the initial analysis of the concept were the Enlisted Force Management Plan for 1980, the respective Automated Unit Reference Sheets[2] (AURS) for the combat arms units to be rotated/replaced in the steady state, and various reports from the DA DCSPER reflecting enlisted continuation rates by military occupational specialty (MOS) and years of service. The DA DCSOPS provided the 21 March 1980 Department of the Army Force Accounting System Active Army Troop List,[4] the FY 83-87 Program Objective Memorandum (POM), and guidance from the Division 86 Transition, Planning, and Implementation Group (TPIG).

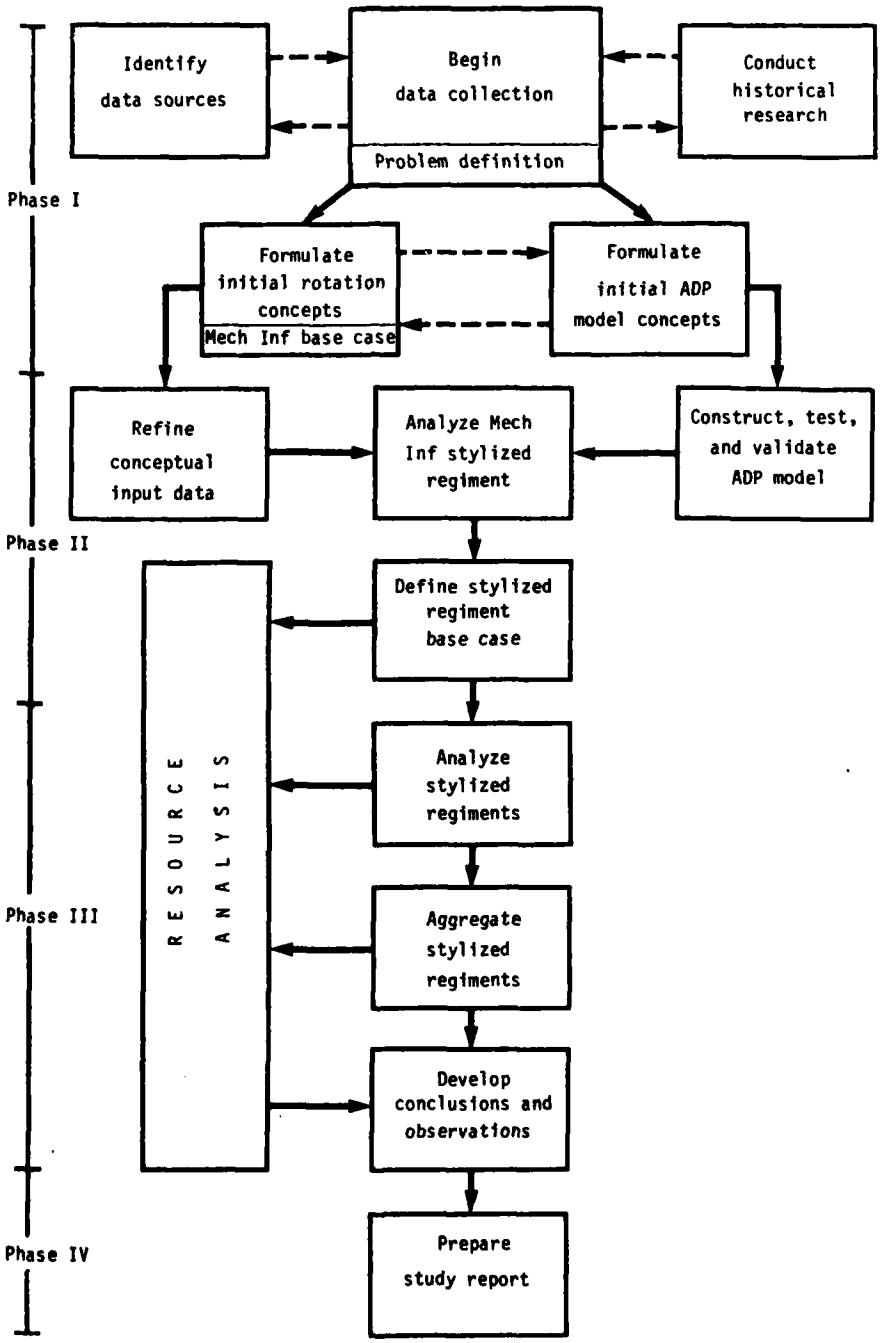


Figure 2-1. Study Methodology

(2) Conduct of Historical Research. Prior to receipt of the Manning Task Force Concept Paper, the study team undertook an historical review of the past Army attempts at unit rotation/replacement. A review of GYROSCOPE, OVUREP, and ROTAPLAN, those unit rotation/replacement concepts planned and, to a limited degree, executed between 1955 and 1963, showed that the major drawback to these concepts was that the rest of the Army was in competition for personnel with the rotational units. The manning of the Army was not conducive to sustaining the concepts. For example, although the GYROSCOPE rotational units initially reported increases in cohesiveness, unit stability, and operational effectiveness, the replacement of the initial set of first term enlistees in the OCONUS theater caused the system to degenerate toward the more turbulent situation of a total individual replacement scheme. The review also demonstrated the necessity for a manning system wherein the fill of authorized positions is predictable and managed such that deploying units do not have to rob other units to meet minimum deployability criteria.

(3) Data/System Collection and Analysis. During the development of the study plan and prior to receipt of an approved concept from the Manning Task Force, macroanalyses were performed on the Division 86 personnel structure and alternative feasible MX and tank (tk) regiment structures composed of various mixes of rotational/replacement battalions.

(a) Division 86 Macroanalysis. The macroanalysis of the Division 86 MX battalion provided insights into potential problems in MOS/grade structure feasibility that were largely independent of mode of unit rotation or replacement, and insights into intraunit mobility caused by promotion, reenlistment, retirement, and unprogramed loss and stabilization conditions of unit assignments. The results of these macroanalyses are provided in Chapter 4. Emerging conceptual insights resulting from the macroanalyses were provided to the Manning Task Force and served to provide the basis for revision of the study directive and refinement of both the regimental concept and the subsequent analytic model of the concept.

(b) Phased Analytic Approach. During this period a decision was made to first analyze the MX regiment(s) in detail and then apply the findings and conceptual insights to the analysis of other combat arms regiments. The structure for the MX battalion in the 1986 to 1990 period was more clearly defined than the other type combat arms units to be analyzed. Also, the numbers and locations of MX battalions provided a reasonably well-formed structure for rotation while satisfying regimental affiliation and homebasing requirements. Another factor driving the decision was the requirement to provide analytic results prior to 1 August 1981, as the results were deemed important to the development of the Army Implementation Plan for the New Manning System (NMS).

(4) Formulation of Initial Rotation Concepts. The description of the regimental concept, as provided by the sponsor, was very general. Concepts such as homebasing and regimental affiliation, although not totally foreign, required a great deal of definition. The Six-Year Rotation Model, which was to be the framework of the concept, provided a direction for action, but also required definition. Chapter 3 of this report presents and defines these concepts. The definition and evolution of these concepts lead to the requirements for multiple assumptions and eventually to the parametric analysis of a "stylilzed regiment" (see Chapter 5). Many of these assumptions were made by the study team on an "as needed" basis and are listed throughout the report and consolidated in Appendix E.

(5) Formulation of Initial Analytic Techniques. Several analytic modeling techniques were suggested by the problem presented. As there were multiple conflicting objectives to be met, the use of mathematical programing was examined. The flow of personnel in and out of units required certain minimum personnel fills, suggesting a possible use of an inventory theory approach. Since the rotation or replacement concept involved movement of units from place to place such that the number required at each place was predetermined, network flow techniques were also considered. Each of the foregoing have distinct advantages but these were outweighed by inherent disadvantages. The deterministic, closed form, mathematical techniques would not have produced the measures of effectiveness and cost (MOE/MOC) needed by the decisionmaker to compare alternative concepts. No known network analysis/math programing technique would have guaranteed that an individual would return to his regimental homebase, let alone be able to determine how long he remained there (or anywhere else for that matter), without modeling each individual as a decision variable--not a rational application of such techniques. These limitations dictated development of a stochastic simulation model based upon personnel flow, designed to meet the inventory needs of the component parts of the regiment, i.e., the rotation/replacement units and the various extraregimental assignments (ERA) (aggregates of OCONUS theater, CONUS or homebase-oriented authorized positions not within units having the regimental designation).

c. Phase II

(1) Refinement of Conceptual Input Data. Examination of TOE and TDA unit strengths by location quickly revealed that no two combat arms regiments would be identical and that, to preclude setting up and analyzing a model of each potential regiment in the Army, some analytic shortcut would be required. As a result, the stylized regiment was born. The stylized regiment, consisting of two or more rotational, nonrotational, or replacement battalions and a fair share slice of the TDA and EAB requirements by geographic location (for the MOS concerned), looks like no single regiment yet represents all potential regiments of its type. Stylization permits the calculation of the Army-wide requirements for each type regiment through multiplication of the requirements

for one stylized regiment by the number of stylized regiments equating to the actual, Army-wide end strengths and numbers of tactical units (battalions or squadrons). During the course of the analysis, updates of the projected TOE for some of the various type regiments were received and, where appropriate, incorporated in the analysis. Variations on the Army force structure were also examined because of proposed modifications to the latest POM. These modifications did not prove to be counterproductive since the phased approach to the analysis meant delaying the analysis of the other combat arms regiments until fairly late in the study. A detailed discussion of the regimental stylization process is found in Chapter 5.

(2) Construction, Testing, and Validation of the Analytic Model. Figure 2-2 depicts the overall modeling methodology.

(a) URSAM. The Unit Rotation/Replacement System Analysis Model (URSAM) is the aggregate of four submodels: the Personnel Evaluation Model (PERSEM), the Regimental Personnel Flow Model (RPFM), the Force Cost (FORCOST) Model, and the Regimental Statistical Analysis Model (RSAM). Detailed discussion of these submodels, their functioning, inputs, and outputs, is found in paragraph 2-3, Chapters 5 through 7, and Annexes G through J.

(b) Model Construction. The URSAM is designed to produce relevant measures of effectiveness and cost (MOE/MOC) based upon the simulation of a full stylized regiment over a period of time sufficient to ensure the process was in steady state. To this end, the simulation model (RPFM) was initially set to run for 30 years before statistics necessary to the calculation of the MOE/MOC would be captured. The FORCOST Model and RSAM are, respectively, adaptations of the Army Force Cost Information System model and the commercially procured Statistical Package for the Social Sciences. Both models were designed to provide relatively quick calculations of one-time and recurring MOE/MOC. (Some of the MOE initially produced by RSAM were eventually reprogramed as output directly from RPFM.) The PERSEM was run separately to perform a macroanalysis of the sustainable personnel structure resulting from input rates of promotion, reenlistment, and attrition. All programing of the component models was done by the members of the study team, with the exception of FORCOST, which had been previously developed and used in support of other CAA studies. URSAM was designed from the beginning to be generalized, thereby allowing the analysis of a wide range of rotation/replacement concepts. Consequently, the model has several features such as alternative methods of calculating first term group (FTG) fill levels that have not been needed in production runs to date.

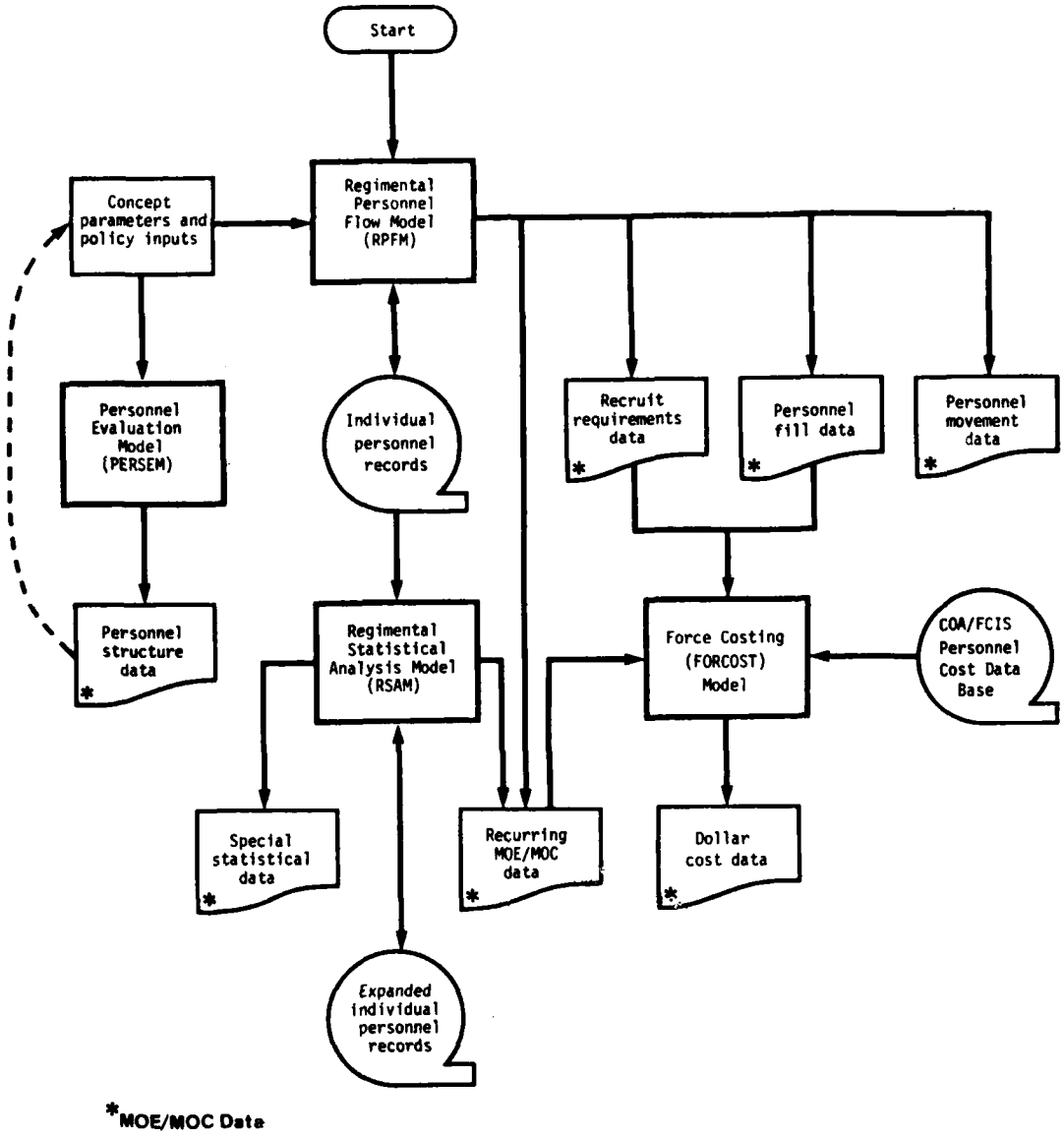


Figure 2-2. Modeling Methodology

(c) Model Testing and Validation. Testing of URSAM was accomplished by first setting up dummy input data, running selected components of the model, and checking the output against expected results. Actual input data were then used for 2- to 8-year test runs of RPFM, with the output being run through RSAM for statistical analysis. During this period, multiple short runs of RPFM were made using five different random number seeds. The variation observed in model results was within five percent of the respective mean values for the five runs. Thereafter, one random number seed was used to initiate all randomly started test and production runs of RPFM. During the course of the study, model results were continuously compared with expected results. Observed inconsistencies proved to be the result of either correctable errors or erroneous expectations due to factors not intuitively obvious from the onset. As such, the model became a valuable tool for developing insights and substantiating the judgment and expectations of personnel managers.

(3) Analysis of Initial Concept

(a) Initial Production Runs. Using various policy options, eight production-level runs were made of the initial stylization of the MX regiment. The results were briefed to the Manning Task Force (7 Jul 1981) and a technical sub-SAG (9 Jul 1981). The intent of the briefings was to elicit guidance on which policy option to include in the final version of the concept. Guidance was given to concentrate on detailed analysis of the MX regiment to provide input to the 20 August 1981 CSA in-process review (IPR) of the the NMS Concept.

(b) Study Directive Revision. The August 1981 CSA IPR resulted in the expression by the major commanders and DA staff principals of specific concerns regarding the concept. The URSA study directive was thereafter changed, as shown at Appendix B, to include a parametric analysis of selected policy options using the revised MX regiment model. The revision also clarified the split of the URSA study into URSA I (battalion level) and URSA II (company level). (Discussion and results of the parametric analysis are in Chapter 5.)

(4) Definition of the Final MX Regiment Concept. Following completion of the parametric analysis, a new MX regiment final production run was made. The new MX run showed an inordinate number of E-5 personnel being purged from the system due to significant temporary overstrengths--thereafter resulting in shortages of senior grade NCO. As a result, a further modification to model logic was required before a record run of the MX case was made. (Discussion of the phenomenon producing the lower grade NCO overstrengths is found in Chapter 5.) (NOTE: This background is stated here as a caveat against the reader attempting to directly compare initial MX model results with the final results.)

d. Phase III. While the detailed analysis of the MX case was in progress, initial macroanalysis of the remaining combat arms regiments was performed. During this period the team members recognized the advantage of stylizing the regiments along CMF/MOS lines; therefore, the MOS 19D scout platoon personnel were removed from the stylized MX regiment and were included in the stylized heavy division cavalry (HC) regiment.

(1) Analysis of Remaining Stylized Combat Arms Regiments

(a) The Type Regiments. The remaining combat arms battalion-level units, subject to rotation/replacement, were formed into the types of stylized regiments as described in Chapter 5. Analysis of these regiments, e.g., the airborne infantry, was necessary to allow calculation of the CMF-wide results.

(b) The Modeled Policies. Most of the concept policies used in the MX case were directly applicable to the other type regiments, but as most of the other regiments were less well-formed, in terms of the balance between CONUS and OCONUS battalions, some model logic or data base modification was required. Perhaps the most significant example is the decision to create replacement armored cavalry (AC) squadrons in order to better balance the CONUS and OCONUS requirements in the existing armored cavalry regiments (ACR). (Note: The stylized ACR and the existing ACR are not the same since the stylized ACR is, essentially, one-half of each of the existing ACR.)

(c) Production Runs. Short test runs were made of each of the other type stylized regiments to verify the accuracy of the data bases and check the model logic, then a production run was made of each. In the majority of cases, some unique feature of the stylized regiment produced new insights and results not detected in the short test runs that warranted adjustments to the input data or the policy parameters being modeled before a record run could be made. Detailed individual stylized regiment results have been provided to the study sponsor, but only significant deviations from the MX case are reported in this report.

(2) Aggregation of Results by CMF (11, 13, and 19). Because stylization presupposes no movement among unlike type regiments (except that replacements having the same grade, time in service, time in grade, and MOS would be exchanged between regiments when a careerist would opt out of the regiment), the full resource requirement for a CMF is the product of the requirements of each type regiment in that CMF by the number of that type regiment, summed over all type regiments in that CMF. The CMF-wide and full steady state results are provided in Chapters 6 and 7 and are based upon the same MOE/MOC used in the detailed MX analysis.

(3) Contingency Force Analysis. The final portion of the analysis examined the impact of deploying a brigade-size force on a contingency mission. The study team examined the scope of the resultant disruption of the scheduled unit rotation or replacements. Estimates were then made of corrective actions necessary to maintain the manning of the deployed contingency force, the other battalion-level units, and the ERA positions directly affected by the interruption in the scheduled rotation/replacement of units and individuals.

e. Phase IV. This phase encompassed the documentation of the study results and preparation of the study report.

2-3. ANALYTIC TOOLS. The analytic tools employed in the URSA-I study are as shown in Figure 2-2 and as mentioned in paragraph 2-2, above. Program code, input and output data bases (saved on magnetic tape), and model printouts are stored at CAA. Appropriate copies of the programs, listings of input data, and summarized output for all analyses performed have been provided to the Manning Task Force for follow-on analysis, as appropriate. A description of each submodel of URSAM, to include a flowchart, model logic, and input and output requirements, are provided in appendices as indicated:

- Regimental Personnel Flow Model (RPFM): Appendix G
- Regimental Statistical Analysis Model (RSAM): Appendix H
- Force Costing Model (FORCOST): Appendix I
- Personnel Evaluation Model (PERSEM): Appendix J

2-4. QUALITY ASSURANCE. In addition to the model validation steps indicated in paragraph 2-2, above, technical assistance was obtained from the Mathematics/Statistics Team, Technology Support Group, Methodology and Computer Support Directorate of CAA in setting up the experimental design and analyzing the results of the MX case parametric analysis. Two CAA technical review boards (TRB), two sponsor-directed technical sub-SAGs and numerous CAA command group and study sponsor deskside briefings were also given regarding the in-progress study results, in addition to the Product Review Board review required of every formal CAA study.

CHAPTER 3

THE REGIMENTAL SYSTEM

3-1. INTRODUCTION. When the URSA I Study was initiated (December 1980), the unit rotation system was little more than a few broadly defined ideas formulated to address the Chief of Staff, Army (CSA) goal of keeping soldiers together in units longer. During the first phase of the study, the Manning Task Force (MTF) and the URSA I study team, using these general concepts, formulated the rotation system to be examined in the study. This chapter describes the rotation system which evolved in terms of the battalion grouping requirements of the proposed system, rotation models conceived and developed to support the concept, regimental structures which evolved, and unit movement actions.

3-2. UNIT ROTATION SYSTEM PRINCIPLES. The method of achieving the CSA goal, as conceived by the CSA, required the development of a new manning system which would support the rotation of units between a CONUS homebase and OCONUS locations. The principles upon which this system is based were defined by the MTF to be:

a. The unit rotation system will be developed within the framework of a regimental system.

b. Rotating regiments will have one CONUS location to which they will always return, i.e., the homebase.

c. Units which rotate with each other will be organized and equipped identically.

d. There will be fixed assignment windows during which soldiers may leave or enter the rotating unit.

e. For soldiers serving in rotating units, the unit rotation schedule will determine OCONUS tour lengths, reenlistment periods, personnel assignments, and professional development policies.

f. When necessary, the system will be supported by an individual replacement system.

g. Prior to rotation, deploying units will undergo 6 months of predeployment training oriented to the OCONUS assignment.

3-3. BATTALION GROUPING. The principles listed above required the grouping of battalions into rotating sets and the developing of rotation patterns for each set. Several groupings were examined. These ranged from the most general (i.e., all CONUS battalions linked with all like OCONUS battalions) to the most restrictive (i.e., one CONUS battalion linked with one like OCONUS battalion). For the study, the MTF directed

that three grouping sets be used. The first and most common set linked one CONUS battalion with one like OCONUS battalion and was used for all cases in which the OCONUS tour length was 3 years. This grouping was used because it appeared to be the easiest to manage, and it provided for a 3-year CONUS tour. The second and third sets were designed to address the Korean tour length of 1 year. These sets grouped three battalions (two CONUS, one Korea) or six battalions (three CONUS, two Hawaii, one Korea). These groupings provided for acceptable CONUS tour lengths, rotation patterns consistent with the concept, and a means by which Hawaii units could support Korea requirements.

3-4. ROTATION MODELS. A rotation model was developed for each battalion grouping. These models incorporate the rules governing unit, first-term group (FTG), and careerist movement and stabilization policies. FTG personnel are those individuals who have completed their initial entry training (IET) but have not completed their first enlistment period. Careerists are those individuals who have completed their first enlistment and have reenlisted. The rotation model for the two-battalion grouping (3-year OCONUS tour) is the most commonly used and became the basis for the other rotation models. It is referred to as the Six-year Rotation Model (from the MTF Concept Paper[1]) and is reproduced in Figure 3-1. The following paragraphs amplify the concepts illustrated.

a. Unit Movement. Unit movement occurs at the rotation points represented by the vertical line segments. The unit spends 3 years CONUS, rotates OCONUS for 3 years, and then rotates back to the same CONUS location to repeat the cycle. Major items of equipment remain in place and become the property of the incoming unit.

b. FTG. FTG fill occurs every 36 months with the FTG remaining in the unit until the subsequent fill. Fills occur midway between the CONUS and OCONUS assignments. The enlistment period for the FTG is 36 months plus the duration of initial entry training (IET). The IET period varies depending upon the requirements of that particular MOS. FTG who reach ETS and reenlist become careerists.

c. Careerists. Careerists are stabilized (not reassigned from or to the unit) except for two assignment windows:

(1) Postdeployment Window. This window is the primary assignment window and occurs immediately following the return of the unit from OCONUS. All standard reassignments (e.g., to and from TDA, schools, staff, etc.) are allowed. Careerists newly assigned to the unit should expect to remain with the unit for at lea 6 years.

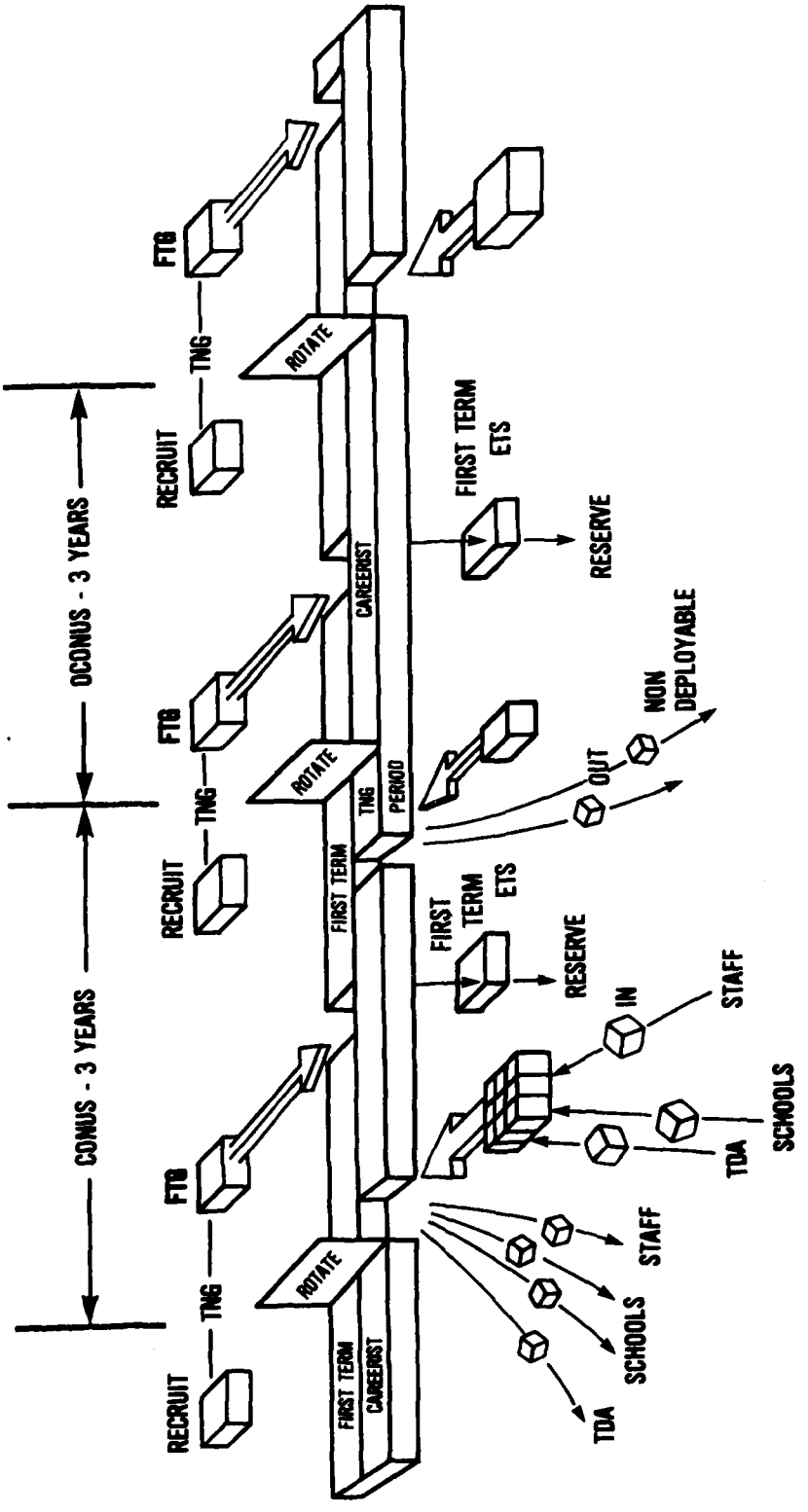


Figure 3-1. The Six-Year Rotation Model

(2) Predeployment Window. The purpose of this window is to allow limited reassignment (e.g., for separation or nondeployable reasons) to prepare the unit for overseas deployment. Normal reassignments for personnel who have spent sufficient time (at least 6 years) in the unit can also occur, however, unit strength and stability requirements may limit the number of these reassignments. This window occurs 6 months prior to the unit's OCONUS deployment.

3-5. KOREAN ROTATION MODELS. The 1-year Korea tour length forced the development of different rotation models. These models were patterned as closely as possible to that described in the previous paragraphs; however, major differences in the modeling concepts were required. The two concepts, each of which are dependent on differences in battalion groupings, are described below:

a. Concept One - Grouping of Three Units (2 CONUS, 1 Korea)

(1) Unit Movement. A unit spends 2 years CONUS, deploys to Korea for 1 year, and returns to CONUS. This pattern is repeated twice in the 6-year cycle.

(2) FTG. FTG fill is every 36 months with the FTG remaining in the unit until the subsequent fill. The fill occurs 6 months prior to the unit deploying to Korea.

(3) Careerists. Careerists are stabilized in the rotational units except for two windows. These windows are three years apart and occur one year prior to unit deployment to Korea. Rules for both windows are similar to those for the European postdeployment window.

b. Concept Two - Grouping of Six Units (3 CONUS, 2 Hawaii, 1 Korea)

(1) Unit Movement. A unit spends three years in CONUS, relocates to Hawaii for two years, and then deploys to Korea for one year. The unit then returns to CONUS and repeats the cycle.

(2) FTG. FTG fill is every 36 months with the FTG remaining in the unit until the subsequent fill. One fill occurs 6 months prior to deployment to Korea and the other midway between the CONUS tour.

(3) Careerists. Careerist assignment windows occur during the CONUS tour as in the long tour rotation model. The first window (postdeployment) occurs immediately following the return of the unit to CONUS from Korea and the second window (predeployment) occurs 6 months before the unit relocates to Hawaii.

3-6. REGIMENTAL STRUCTURE. The principle requiring that the rotation system be developed within the framework of a regimental system dictated the development of regimental structures to support the system. The structure of the various "regiments" is dependent upon the rotation

scheme. For example, a regiment with a 3-year OCONUS rotation normally would contain two (one CONUS, one OCONUS) or some multiple of two paired battalions. Battalions not paired would not rotate, and, in most cases, these battalions would not be part of any regiment. In order to keep the analysis of the regiments manageable, feasible prototype regiments were stylized using the fewest number of units required for a particular rotation concept. The structuring methodology is described and amplified in Chapter 5.

3-7. REGIMENT MANNING REQUIREMENTS. The structure of the regiments, in terms of rotating battalions, dictated the basic manning requirements for each regiment. However, in addition to the manning of battalions, each regiment must man its fair share of positions external to the battalions. Although these positions are not considered part of the regiment, individuals occupying these positions maintain their regimental affiliation. The demands are called extraregimental assignments (ERA) and include:

- Positions in other regiments (e.g., an infantry soldier in Regiment A assigned to a tank battalion in Regiment B).
- Positions in nonregimental units (e.g., a nonrotating OCONUS unit).
- CONUS and OCONUS TDA assignments.
- CONUS and OCONUS TOE echelons above battalion (EAB) assignments

Chapter 5 further details the manning of the stylized regiments.

3-8. UNIT MOVEMENTS. The rotation models described in previous paragraphs imposed a requirement for two types of unit movement. These types of unit movement are described below.

a. Unit Rotation. Unit rotation is the displacing of one rotating unit by another unit. Figure 3-2 portrays this occurrence. A unit moves from a CONUS homebase to an OCONUS location (or series of locations) and returns to the CONUS homebase. Members of the unit move with the unit and are not treated individually.

b. Unit Replacement. Unit replacement is the displacing of a soon-to-be-disestablished unit by another unit. This action is portrayed in Figure 3-3. Like unit rotation, a unit moves from a CONUS homebase to an OCONUS location or series of locations. Unlike unit rotation, the unit being replaced is disestablished upon completion of its OCONUS tour and the personnel who had been assigned to the unit receive individual PCS orders. If the individual is ordered to a rotating unit, the PCS will occur during an assignment window of the new unit. The unit replacement action creates a void in CONUS of one unit. A new unit is formed in CONUS to fill this void. The forming of a new unit is

required when insufficient CONUS units are available to rotate with OCONUS units, and the maintaining of the OCONUS units with individual replacements is not preferred.

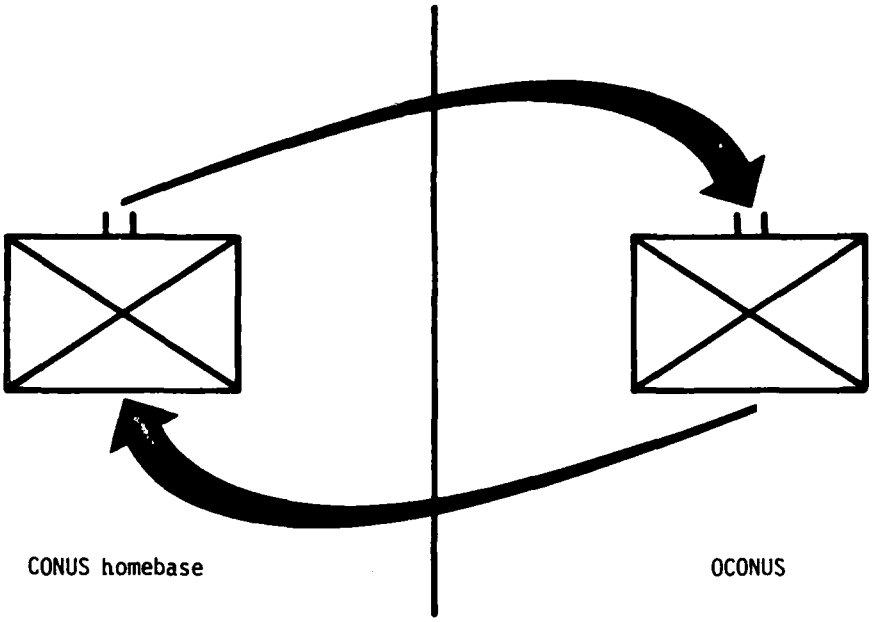


Figure 3-2. Unit Rotation

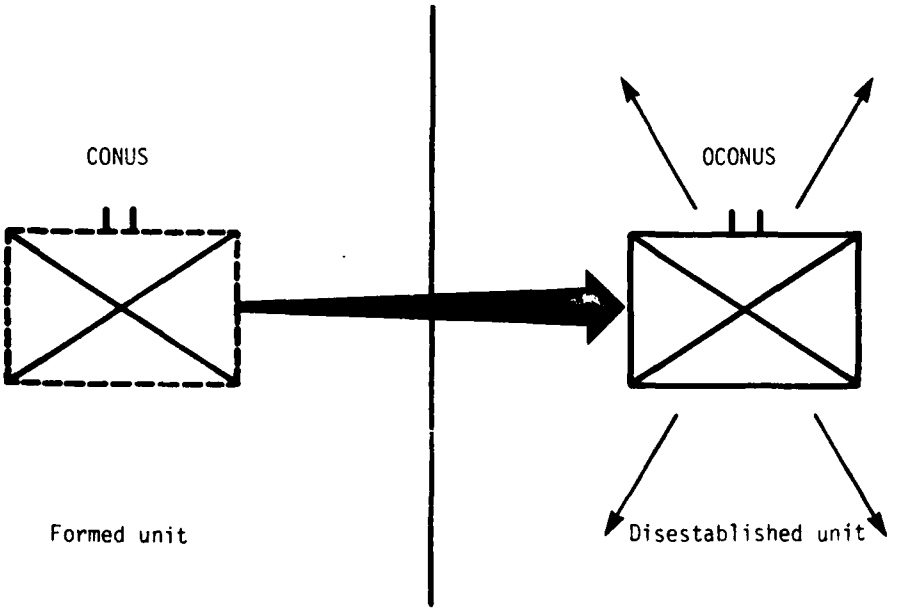


Figure 3-3. Unit Replacement

CHAPTER 4

ANALYSIS OF THE UNIT ROTATION CONCEPT

4-1. INTRODUCTION. The purpose of this chapter is to investigate and present the significant aspects of the rotational concept. The discussions treat both the units and the individuals within the units. The analysis is primarily subjective as opposed to the objective analysis of the detailed modeling results which are discussed in Chapters 5, 6, and 7. Significant aspects of the concept include the amount of unit participation, manning level policies, enlistment/reenlistment policies, CONUS ERA aspects, and regimental system flexibility. These aspects are discussed below.

4-2. UNIT PARTICPATION. One of the major considerations of the unit rotation concept is the degree, in terms of unit participation, to which it can be implemented. In addition to characteristics associated with the rotation concept, the existing force structure and its inherent limitations will determine the degree to which unit rotation can be implemented. Specifically, the amount of battalion participation depends on the requirements of the rotation patterns, the number of available battalions, their location (CONUS/OCONUS), and their mission requirements. In this study, school support, national training center, and ranger missions were the only functions that prohibited units from rotating. Table 4-1 summarizes the degree of battalion participation in unit rotation for the assumed force structure. (The details of the force structure are covered in Chapters 5 and 7.) Even with minimal mission limitations, 79 percent of the available battalions could be employed in rotation under the requirements of the basic concept. This might become an upper bound as the question of unit rotation is investigated further and other limitations and requirements are imposed. A detailed analysis of the amenability of the force structure to the particular rotation concept should be an integral and preliminary part of any future force structure analysis.

Table 4-1. Number of Battalions[a] Participating By Career Management Field (CMF)

CMF	CONUS[b]		OCONUS		Total		Percent rotating
	R	NR	R	NR	R	NR	
Infantry	40	20	40	3	80	23	78
Artillery	38	6	32	10	70	16	81
Armor	27	13	27	11	54	14	79
Total	105	39	99	24	204	53	79

[a]R = rotating battalions, NR = nonrotating battalions.

[b]Provisional replacement battalions are not included.

4-3. MANNING LEVEL POLICIES. An important factor in determining the viability/acceptability of the concept is the impact of manning policies needed to support unit rotation. Policies which affect manning requirements are: the requirements for the FTG fill to occur every 3 years, and the E-1 to E-4 strength to remain above the authorized level of allowance (ALO) three. (Table 5-2 displays the percent of TOE for ALO 2 and 3 as used in this study.) The following discussion compares manning requirement impacts under the unit rotation concept with those under an individual replacement system (analogous to current procedures), given that both systems must maintain the unit at or above a minimum strength level.

a. Individual Replacement. Under an individual replacement system, FTG personnel are input individually or in small groups depending on the needs of the unit. If the unit strength is maintained at the minimum level the FTG fill rate would be continuous and equal to the attrition rate at that level. The average strength would equal the minimum strength level.

b. Unit Rotation. Under the unit rotation concept, FTG personnel are input as a group every 3 years (FTG block fill). To keep the unit strength above the minimum level, the FTG fill must be sufficiently large so as to account for attrition expected to occur during the next 3 years. A computerized program, the Personnel Evaluation Model (PERSEM),

was developed to demonstrate these principles notionally. Figure 4-1 illustrates the E-1 to E-4 strength over time for a typical rotating battalion based on the Six-Year Rotation Model. The minimum strength (E-3/E-4 ALO 3) level was assumed to be 93 percent of the E-3/E-4 authorized (ALO 1) strength. Attrition and promotion rates were based on current data for the CMF 11 population from the following sources: ODCSPER Report, Enlisted Force Master Plan, 1980 (UNCLASSIFIED); ODCSPER Report, Continuation Rates generated from DCSPER Report 411, May 1981 (UNCLASSIFIED); ODCSPER Report, FY 79 Enlisted Personnel Transition Matrix, DCSPER Report DMDC 9M4232, March 1979 (UNCLASSIFIED); and ODCSPER Report, Accession Cohort Reporting System, April 1981 (UNCLASSIFIED). As shown in the figure, the average manning level is about 115 percent of ALO 1 (as opposed to the minimum acceptable value of 93 percent of ALO 1). The arrival of the FTG block fill causes the E-1 to E-4 strength to jump from approximately 93 percent of ALO 1 (just before the FTG arrival) to approximately 160 percent of ALO 1 (just after the arrival). Approximately 20 percent more FTG were needed to maintain the ALO 3 strength than when using the individual replacement.

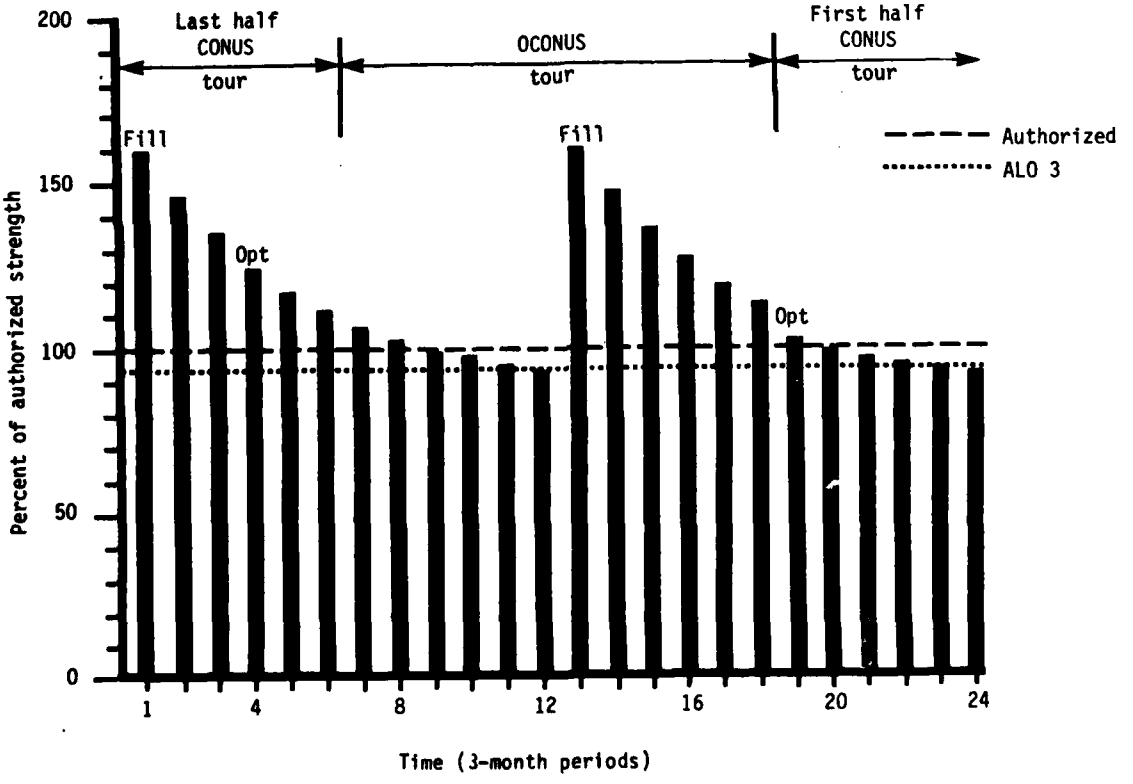


Figure 4-1. E-1 To E-4 Strength Over Time for a 93 Percent Minimum Manning Level

c. Summary. Although the preceding discussion focused on a hypothetical example the trends can be expected to occur in the stylized regiment results. Actual results of the detailed simulations for the different regiments are illustrated and discussed in Chapters 6 and 7.

4-4. ENLISTMENT/REENLISTMENT POLICIES. The rotation concept directly impacts the policies and management of enlistment/reenlistment. The following describes these impacts.

a. Initial Enlistment. A directed study assumption (see Appendix B) is that the initial enlistment length will be variable--total initial enlistment must be for 3 years plus the time for initial entry training (IET). IET consists of basic and advanced individual training (the time for which is MOS independent) and is completed prior to the arrival of the soldier at his initial assignment. Given the constraints of a 3-year OCONUS deployment for the rotational unit and an equal CONUS period in the cycle, enlistments of only 3 years (i.e., without extension for IET) would result in a gap between the end of one enlistment period and the arrival of FTG replacements. There could be both CONUS and OCONUS gaps or one extended gap (during the CONUS or OCONUS portion of the rotational cycle), but, in any case, there would be substantial personnel shortfalls during the gap(s). Although other alternatives could be incorporated into the rotational concept to address this problem, the basic scheme advocated adding the IET time to the initial enlistment, which would eliminate the gap.

b. Reenlistment. A requirement of the rotational concept is that careerist reenlistments vary depending upon the assignment. For stabilized units, careerist enlistment termination can only occur at the careerist assignment windows. Under the Six-Year Rotation Model, careerist enlistment lengths are: from the postdeployment window to the predeployment window, or approximately 30 months; and from the predeployment window to the postdeployment window, or approximately 42 months. For other assignments the enlistment length is 3 years. Reenlistment lengths are dependent on the individual's next assignment. These lengths must be variable and conform to the new assignment requirements.

4-5. CONUS EXTRAREGIMENTAL ASSIGNMENT (ERA) ASPECTS. The nonrotating CONUS ERA serve as a focal point for all other assignments by being the primary agent for the performance of four functions which have significant impact, in terms of the CONUS tour lengths, on the nonrotating CONUS ERA. The CONUS ERA functions, listed below and further described in subsequent paragraphs, are:

- To receive and send FTG and careerists to OCONUS nonrotating positions.
- To receive and send careerists to rotating units (referred to as unit refreshment).

- To send careerist to units being formed (first step in unit replacement action).

- To receive FTG and careerists from a unit being disestablished (completion of unit replacement action).

a. Reassignments from OCONUS Nonrotating Positions

(1) Since the tour lengths for the FTG in OCONUS nonrotating positions are less than the initial enlistment length in the regiment, those FTG initially assigned to these positions must return to CONUS for the remainder of their enlistment. These returning FTG must go to CONUS ERA positions because the regimental rotating units are at that time stabilized and unable to accept any fill. Since most CONUS positions for FTG are in the rotating units, many of the returnees assigned to the CONUS ERA will be malassigned. They will be slotted in higher grade positions, occupy slots for different MOS, or be carried excess. Also, many of the returnees will not reenlist, resulting in positions being occupied for less than 2 years.

(2) The careerists returning to CONUS after an OCONUS nonrotating unit assignment will also generally go to the CONUS ERA. In the rotation models, careerist assignment windows occur only when the rotating unit is located in CONUS. While some opportunity exists for returnees to go to rotating unit assignments, unit stabilization during the majority of its CONUS tour inhibits the acceptance of returning careerists.

(3) These problems significantly affect turnaround time (i.e., the time between OCONUS assignments) and turnover rates in the CONUS nonrotating positions.

b. Unit Refreshment. To preclude segregation of regimental personnel into separate ERA and rotating unit groups, assignment times to the rotating units are limited. This limitation results in a gradual turnover/replacement of the unit personnel (i.e., unit refreshment). Because careerist assignment windows occur only when the unit is in CONUS, the principal source of personnel to "refresh" the unit is the CONUS ERA. This ensures periodic refreshment of the unit with careerists, but is an additional turnover burden that the CONUS ERA must support.

c. Unit Replacement Actions. Unit replacement actions become necessary whenever there are insufficient CONUS units available to rotate with OCONUS units and when maintaining the OCONUS units through individual replacement is not preferred. In a unit replacement action, personnel in the replacing unit are rotated as in a unit rotation action and the replaced unit is disbanded. Both of these actions impact the CONUS ERA.

(1) While the replacing unit is being formed, the logical source for careerists is the CONUS ERA. The careerist leaving the rotating

unit at the postdeployment window has just completed an OCONUS tour and would not be the logical choice for assignment to a unit which is about to deploy. At the predeployment window of a rotating unit, the flow of personnel is expected to be into the unit, and it cannot be a source of personnel for a replacement unit at this time.

(2) A portion of the careerists in the replaced unit at the time of disbanding moves to the CONUS ERA. Under certain replacement action schedules, the disbandment will occur at the same time as the postdeployment window of a rotating unit. In these cases, the assignment of a careerist to the rotating unit would be a logical one. The same is not true for the FTG as the rotational unit would still be above minimum E-1 to E-4 levels, and the FTG returning from the replaced unit would have only a short period left on their initial enlistments. Therefore these personnel would probably be assigned to the CONUS ERA.

(3) In general, unit replacement actions require the support of the CONUS ERA as both a supply of and a demand for careerists. This additional burden is significant when the population of the replacement unit is large.

d. Nondeployable Personnel. Under the unit rotation concept individuals assigned to a rotating unit remain with that unit through at least one OCONUS assignment. A modeling assumption is that individuals assigned to the regiment can be assigned to a rotating battalion. These two factors result in the condition that all individuals in the modeled regiment are considered deployable. If nondeployable personnel were assigned to the regiment, their assignments would have to be limited to CONUS ERA. The impact of this is that even fewer CONUS positions would be available to which OCONUS returnees can go.

e. Summary. The preceding comments have identified the various impacts on the CONUS ERA associated with the basic rotational concept. When these factors are combined, the total burden on the CONUS ERA is significant. The implications are that the CONUS ERA will be called upon to act as the principal personnel movement route within the regiment. With this burden of supporting the major portion of personnel transfers, there will necessarily be associated penalties in terms of reduced turnaround times and high turnover rates in the CONUS ERA. The actual extent and magnitude of the penalties are dependent upon the specifics of the overall rotation scheme and the population sizes of units in the particular regiment. Throughout this discussion of the CONUS ERA impacts, the focus has been on a qualitative examination of the required actions inherent in the basic rotational concept. The specifics, in terms of quantitative comparisons between the turnover rates in the units and in the CONUS ERA, are discussed in Chapters 6 and 7, which address the actual results of a computerized simulation.

4-6. REGIMENTAL SYSTEM FLEXIBILITY. Within the regimental system, rotational battalions are linked by common TOE and movement schedules.

Individual assigments are based on regimental needs with units and individuals establishing roots at a single CONUS location. These conditions cause the regimental system to be inherently rigid; therefore, changes to the structure and/or operational characteristics will require detailed planning. The following paragraphs discuss the specific impacts of a regimental system on administrative unit relocations, increases or reductions in the force structure, the introduction of new equipment, and the conduct of contingency operations.

a. Administrative Unit Relocations. There are numerous situations which would require units to be relocated administratively. These actions must be programed and planned so that the impact on the regimental system will be minimal. However, their occurrence will have significant impacts on the entire rotation system. The following paragraphs amplify and discuss these impacts.

(1) Relocating OCONUS battalions to a different OCONUS location should be timed to keep the unit on its CONUS/OCONUS rotation schedule. Moves from OCONUS to CONUS may require more extensive adjustments. For regiments with the returning battalions, unit rotations would be eliminated and individuals would not be assigned to OCONUS as often. To equitably distribute the reduced OCONUS manning requirements, the OCONUS ERA demands will require adjustment. Similar changes occur when relocating a CONUS battalion to OCONUS. When the relocated battalion is a rotational unit, the rotation of the entire regiment is disrupted. If the regiment does not contain sufficient CONUS nonrotating battalions that can be converted to rotating battalions, rotation within the regiment may be curtailed and the affected OCONUS battalions will require individual replacements from other regiments. When relocation occurs within CONUS, changes in homebasing will necessarily result. In addition, the personnel demands of the homebase and Other CONUS (one of the ERA) are altered.

(2) Administrative relocations can affect one or more regiments and require consideration in terms of the overall system. When the decision is made to proceed, intensive personnel management will be required to support the multiregimental aspects of the action.

b. Force Structure Changes. Newly created battalions could be absorbed and supported by a regiment with similar battalions or, if nonregimental, could be supported by individual replacements from many regiments. Inequities in the system could be spread across the CMF by adjusting the ERA demands of the involved regiments. Eliminating rotational battalions would significantly alter the parent regiment. It could cause the loss of regimental identity if rotation of the remaining battalions in the regiment must be curtailed. These battalions would be supported by individual replacements from other regiments. In either case, these changes would most likely affect regiments across the CMF and must be intensively managed.

c. New Equipment. A condition of the regimental system is that battalions are joined under a rotation concept and will form the nucleus of a regiment. These units will have like equipment; therefore, rotating battalions in a regiment need to receive new systems concurrently. This may place limitations on the ability to concentrate new items of equipment (e.g., M-1 tanks, MLRS) in OCONUS deployed battalions.

d. Contingency Operations. Contingency operations are normally a combined arms effort (infantry, armor, artillery, etc.), therefore, many regiments across several CMFs would be affected. The total impact of a contingency operation depends on the size of the contingency force and the duration of the operation. For short durations, the impact is localized to deploying regiments with reassignment actions simply postponed. For durations sufficiently long that further delays in scheduled unit/individual reassignments become impractical, the impact may be felt across the CMF(s). Unit rotation, at least in the regiments with deployed battalions, would require curtailment and an individual replacement system supported by the remainder of the CMF would be necessary.

4-7. IMPROVEMENT OF ROTATION CONCEPT POLICIES. For the conduct of an in-depth simulation of the rotation concept, many additional and detailed policies needed to be developed. These were formulated through in-house developmental efforts and by interfacing with the study sponsor. The analysis of the simulation results revealed that some of these policies could be improved. The purpose of this paragraph is to identify those policies and their improvements.

a. FTG Requirements Determination

(1) A basic feature of the block fill concept is the need to anticipate attrition losses. The regimental system was manned with FTG personnel using a procedure based on two specific rules, each of which had limitations. Those rules are listed below with their associated limitations:

- RULE: E-1 to E-4 population will always be greater than the ALO 3 level.

  LIMITATION: This rule fails to consider the requirements for personnel in grades E-5 and above.

- RULE: FTG replacement will be sufficient to account for all E-1 to E-4 attrition (unprogramed loss and promotions to E-5).

  LIMITATION: This rule causes those individuals who are promoted to E-5 to be considered system losses.

(2) The discussions in Chapters 6 and 7 show that in certain instances the use of these rules results in unnecessarily inflated manning levels. The principal problem appears to be that since promotion to E-5 is considered as a system loss of FTG personnel, projections based on the large E-1 to E-4 population tended to overestimate system losses. As noted in paragraph 4-3, the reliance on FTG block fill results in an unavoidable increase in manning levels, however, the impact need not be as severe as seen in the simulations. A more appropriate procedure would be to estimate FTG requirements based on the unit and/or total regimental need.

b. Personnel Movement. In rotating units, FTG fill, careerist reassignment, enlistment/reenlistment, et al., were allowed to occur only during certain windows. Paragraphs 3-4 and 3-5 describe these assignment windows in detail. The effect of these windows is that FTG fill and careerist actions occur at different times (12 months or 18 months apart). This results in delays in the resolution of careerist actions which could occur at the time of the FTG fill. One effect of these delays is an overfill of careerists. Careerists who are excess should be allowed to leave at the FTG fill window rather than wait for the careerist assignment window.

4-8. SUMMARY. This chapter, and the preceding chapter, lay the foundation for the analysis of the rotation system to be presented in Chapters 5, 6, and 7. This chapter presented the results of the preliminary investigation of the unit rotation concept and discussed the expected impacts of various policy assumptions and/or rules. Some systemic problems can be expected. The next chapter applies the rules and policies discussed previously to the development of a typical "stylized regiment." This regiment is then used as an example for the analysis to follow.

CHAPTER 5

THE STYLIZED AND THE MECHANIZED INFANTRY REGIMENT PARAMETRIC ANALYSIS

Section I. EVOLUTION OF THE STYLIZED REGIMENT

5-1. INTRODUCTION. The purposes of this chapter are to outline the concept and development of the "stylized regiment(s)," and, in Section II, to present an overview and results of the parametric analysis of initial policy inputs which was performed to refine the regimental concepts. This chapter provides the immediate background and foundation for the analyses of a stylized regiment and the career management fields to follow in Chapters 6 and 7, respectively.

5-2. CONSTRUCTION OF STYLIZED REGIMENTS. Stylization is an analytic technique to develop a representative sample, the analysis of which can be extrapolated to the population of which the sample is representative. In the instance of this study, the sample, or model, is a stylized regiment. The stylized regiment is composed of combat battalions which are members of the rotation scheme and a fair share slice of the overhead, i.e., the supporting positions in the Army (the ERA positions). The pertinent assumptions, the methodology, and the results of the regimental stylization process are provided below.

a. Simplifying Assumptions. The modeling of the regimental concept required several assumptions over and above those found in the tasking directive (Appendix B). Key assumptions pertinent to the stylization process are listed below:

(1) Maneuver battalions can be analyzed in terms of a small number of high density MOS and individuals in the low density MOS will follow like patterns or be assigned individually.

(2) Individuals will be assigned only in their primary MOS.

(3) Army-wide TDA and EAB personnel requirements will not change by grade.

(4) The flows into and from the Individuals Account (trainees, transients, holdees, and students) are equal, and for a given type regiment are distributed in proportion to the Army-wide distribution.

(5) The Army can add battalion level replacement units to the force structure to balance the CONUS/OCONUS force ratio.

(6) All rotating units of a given type (e.g., MX battalions) are organized, staffed, and equipped identically.

b. Stylization Methodology. Figure 5-1 portrays the general methodology used to determine the structure and manning of each regiment. Each step of the process will be discussed in detail using career management field (CMF) 11 and the MX regiment as an example.

(1) Four data sources provided the framework for the regimental stylization process. These sources and their data contributions are listed below:

(a) Manning Task Force Concept Paper.[1] Provided the proposed rotation concept for the MX regiment.

(b) 1986 Army Force Structure (from Division 86 TPIG). Provided the TOE number for each type infantry battalion in the 1986 force structure.

(c) Division 86 AURS[2] and TOE (from HQ, TRADOC). Provided authorizations for divisional units.

(d) TAADS[3] data base as of 2 July 1981. Provided TDA, EAB, and nonregimental unit authorizations.

(2) These data sources were used to determine the type regiments to stylize based on the location and density of units. For CMF 11, four regiments were stylized. They were: the mechanized infantry (MX), motorized infantry (Mtz), air assault infantry (AA), and airborne infantry (Abn) regiments.

(3) To facilitate the computer modeling process the regimental structure was composed of elements referred to as "pools," i.e., sources of manpower supply and demand. Pool composition for the MX regiment was based on the location and density of the CMF 11 population, the proposed rotation scheme, and concept mandates such as homebasing. Table 5-1 displays the components of the MX regiment pools, the movement category of each pool, and the location(s) of each pool. From/to locations are shown for rotating or replacement units. Figure 5-2 provides a graphic portrayal of the movement concept for the MX regiment.

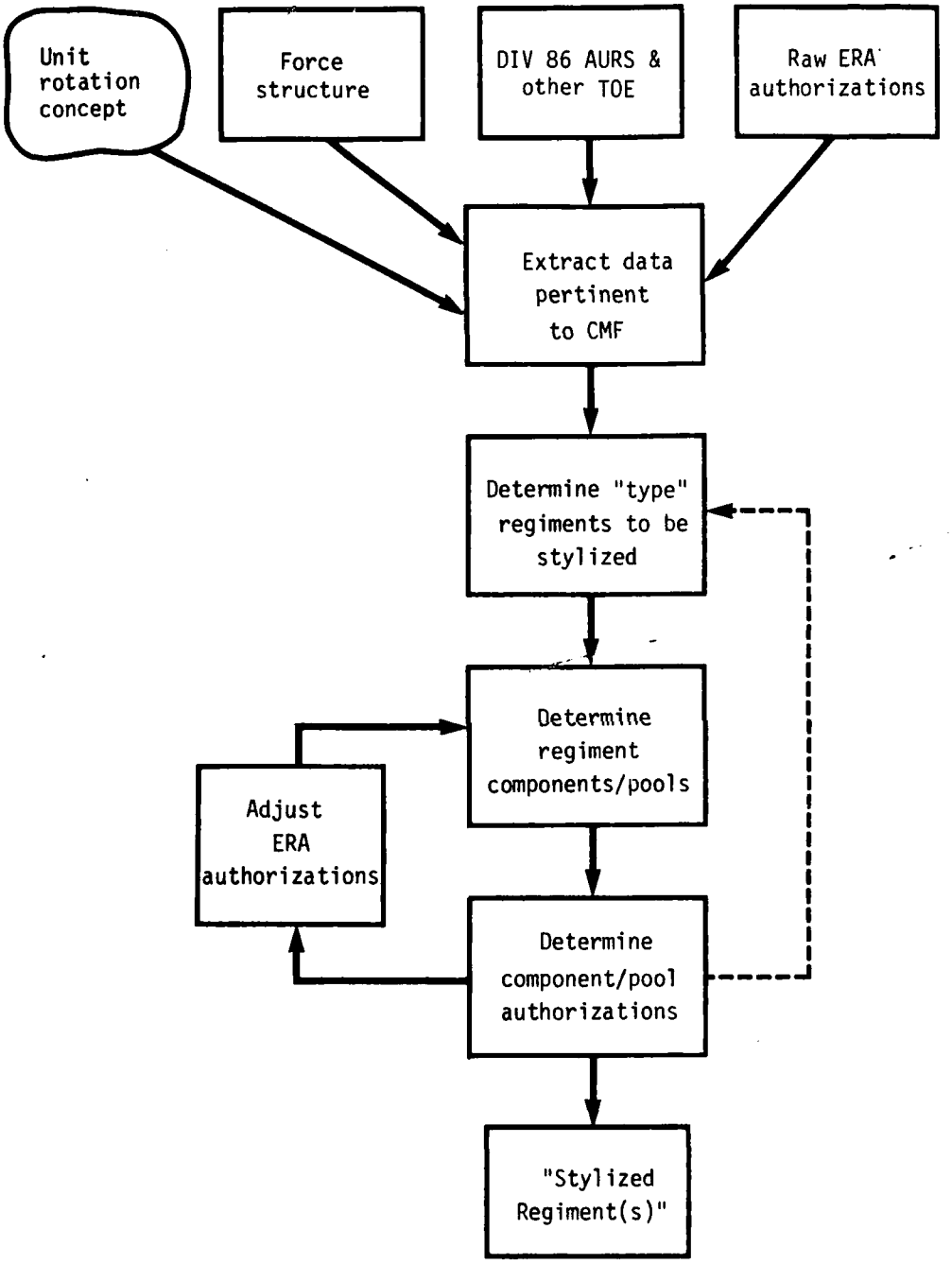


Figure 5-1. Stylization Methodology

Table 5-1. MX Regiment Composition

Pool	Component	Category	Location
1	MX bn	Rotational	CONUS/Europe
2	MX bn	Rotational	Europe/CONUS
3	Mortar plt (tk bn)	Rotational	CONUS/Europe
4	Mortar plt (tk bn)	Rotational	Europe/CONUS
5	MX/tk composite bn	Replacement	Korea/CONUS
6	MX/tk composite bn	Replacement	CONUS/Korea
7	Homebase ERA	Individual replacement	CONUS
8	Other CONUS ERA	Individual replacement	CONUS
9	OCONUS ERA	Individual replacement	Europe
10	OCONUS ERA	Individual replacement	Korea
11	OCONUS ERA	Individual replacement	Panama

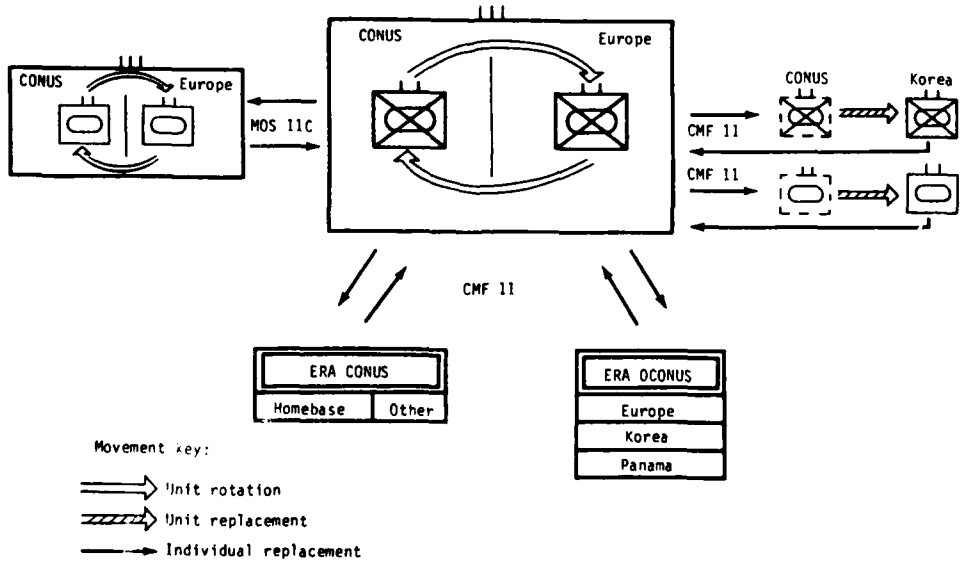


Figure 5-2. Type Stylized Regiment (CMF 11)

(a) The requirement for the pairing of two MX battalions on a CONUS/Europe rotation was cited in the Manning Task Force Concept Paper.[1] The mortar platoons from the tank battalions were included in the MX regiment rather than in a tank regiment because the rotation patterns of these two type battalions are identical, the units are collocated at the same heavy division installation (in the majority of cases), and the potential for MOS 11C career progression lies within the MX battalions, not the tank battalions.

(b) Incorporating the MX and tank battalions located in Korea into the regimental concept in light of their projected equipment differences required the artificial establishment of replacement battalions in CONUS to replace those in Korea on a 2-year cycle. To reduce the number of pools uniquely modeled and thus simplify the modeling process, composite MX/tank battalions were structured. These replacement battalions were each modeled at 1/23d strength (rounded to the nearest individual), which ensured that each of the 23 MX regiments shared the load for manning this pool.

(c) The Homebase, Other CONUS, and OCONUS ERA pools represent a regiment's portion of the TDA, EAB, and any other nonregimental CMF 11 authorizations at those locations. For the MX regiments, the homebases were located at the CONUS heavy division installations (i.e., Forts Carson, Riley, Hood, Polk, and Stewart).

(4) Actual pool authorizations were then determined in the following manner:

(a) For the MX and tank battalions rotating to and from Europe, the CMF 11 authorizations at ALO 1, 2, and 3 were extracted from the Division 86 AURS.

(b) Authorizations for the Korea MX/tank battalion and its replacement pool were shared by all MX regiments. The exact authorizations for each regiment were computed by adding the CMF 11 ALO 1, 2, and 3 authorizations for all MX and tank battalions in Korea and dividing this total by the number of MX regiments.

(c) Homebase ERA authorizations are a weighted average of the number of positions, by MOS and grade, authorized (by TAADS) at each CONUS heavy division installation. (The weighting is proportional to the number of battalions at each installation). When personnel requirements at any installation were higher than the weighted average, the excess was added to the Other CONUS ERA pool to be shared by all infantry regiments. Otherwise, an unfair demand would be placed on battalions which homebase at the installation. For example, during the MX regiment stylization, requirements higher than the weighted average were discovered at Fort Knox and Fort Benning. These were shifted to the Other CONUS ERA pool. As as result of discussions with the MTF, ALO 2 and 3 authorizations (required for modeling purposes) were derived by factoring the TAADS (ALO 1) authorization as shown in Table 5-2.

Table 5-2. Level 2 and 3 Factors

ALO	E-1 to E-4	E-5	E-6	E-7	E-8
2	.90	.90	.95	1.00	1.00
3	.80	.80	.90	.95	1.00

(d) The total authorization for the Other CONUS ERA pool is the sum of the shifted requirements from the preceding paragraph and the CMF 11 authorizations at CONUS installations other than MX regimental home-bases. The authorized strength of the Other CONUS ERA pool for one MX regiment is prorated using the following equation:

$$MXOC = TOC \times \frac{MX\ bns}{Inf\ bns} \times \frac{1}{MX\ regts} \times F,$$

where:

MXOC = one MX regiment's authorization for its Other CONUS ERA pool (by ALO, grade, and MOS)

TOC = total ALO 1 Other CONUS ERA pool authorization (by grade and MOS)

MX bns = number of MX battalions in the force

Inf bns = total number of infantry battalions in the force (MX, Mtz, Abn, and AA)

MX regts = number of stylized MX regiments in the force

F = one, for ALO 1, or the appropriate factor from Table 5-2.

(e) Authorizations to the OCONUS ERA pool were computed in a similar manner. The equation to prorate the authorized strength for an MX regiment OCONUS ERA pool for each theater is:

$$MXO = TO \times \frac{TMX\ bns}{TInf\ bns} \times \frac{1}{MX\ regts} \times F,$$

where:

MXO = one MX regiment's authorization for its OCONUS ERA pool (by ALO, grade, MOS, and theater),

TO = total ALO 1 OCONUS ERA pool authorization (by grade, MOS, and theater),

TMX bns = number of MX battalions in the specific theater, and

TInf bns = total number of infantry battalions in the theater (MX, Mtz, AA, and Abn).

(NOTE: Since there are no MX battalions in Alaska or Hawaii, these locations have no MX OCONUS ERA pool authorizations).

(f) The pool structure and authorizations of the stylized MX regiment are displayed in Table 5-3. Using this same methodology, 15 additional stylized regiments (infantry, armor, and artillery) were developed. The final pool structure and authorizations for all of the stylized regiments are listed in Tables 5-3 through 5-5.

Table 5-3. Stylized Infantry Regiments (CMF 11)

Type regiment	Qty	Regiment components[a]	Component rotation cycle
Mechanized infantry (MX)	23	2 MX bns	3-Yr CONUS/3-yr EUR
		2 Tk bns	3-Yr CONUS/3-yr EUR
		Slice of 2 MX/tk bns (Korea)	1-Yr[b]
		Slice of 2 MX/tk bns (replacement)	1 Yr[b]
Motorized (Hi Tech) infantry (Mtz)	3	6 Mtz bns	3-Yr CONUS/2-yr HI 1-Yr KOR
		1 Mtz bn	3-Yr homebase[c]
Air assault infantry (AA)	8	2 AA bns	3-Yr CONUS/3-yr OCONUS
Airborne infantry (Abn)	3	3 Abn bns, slice of 1 Abn bn	Homebase nonrotating[c] EUR nonrotating[c]

[a]Each regiment includes an ERA pool to which individuals are assigned for 3 years (1 year--Korea).

[b]The OCONUS battalion/squadron disbands upon the arrival of the replacement battalion from CONUS.

[c]Individual assignments.

Table 5-4. Stylized Armor Regiments (CMF 19)

Type regiment	Qty	Regiment components[a]	Component rotation cycle
Armored cavalry (ACR)	3	2 ACR sqdns	3-Yr CONUS/3-yr EUR
		2 ACR sqdns (replacement)	18-Mo CONUS/18-mo EUR
Tank (tk)	24	2 Tk bns	3-Yr CONUS/3-yr EUR
		2 ACR sqdns	3-Yr CONUS/3-yr EUR
		1 Tk bn (Korea)	1 Yr[b]
		1 Tk bn (replacement)	1 Yr[b]
		1 ACR sqdn (Europe)	18 Mo[b]
		1 ACR sqdn (replacement)	18 Mo[b]
Heavy division cavalry (MOS 19D)	5	2 MX bns	3-Yr CONUS/3-yr EUR
		2 Tk bns	3-Yr CONUS/3-yr EUR
		Slice of 2 MX/tk bns (Korea)	1 Yr[b]
		Slice of 2 MX/tk bns (replacement)	1 Yr[b]
		2 Air cavalry assault bdes (ACAB)	3-Yr homebase[c]
Light division cavalry (MOS 19D)	1	2 ACAB	3-Yr homebase[c]
		1 ACAB	1-Yr KOR[c]
		1 Light tk bn	3-Yr CONUS[c]

[a]Each regiment includes an ERA pool to which individuals are assigned for 3 years (1 year--Korea).

[b]The OCONUS battalion/squadron disbands upon the arrival of the replacement battalion from CONUS.

[c]Individual assignments.

Table 5-5. Stylized Artillery Regiments (CMF 13)

Type regiment	Qty	Regiment components[a]	Component rotation cycle
105 Towed (T) (Abn)	1	3 105T (Abn) Bns	3-Yr homebase[c]
105T (Assault)	1	2 105T (Assault) bns	3-Yr CONUS/3-yr AL
		2 105T (Assault) bns	3-Yr CONUS[c]
		1 105T (Assault) bn	3 yr EUR[c]
155T (Hawaii)	2	2 155T bns	3-Yr CONUS/3-yr HI
		1 155T bn	3-Yr homebase[c]
155T (Korea)	2	3 155T bns	2-Yr CONUS/1-yr KOR
		1 155T bn	3-Yr homebase[c]
155 Self-propelled (SP)	19	2 155 SP bns	3-Yr CONUS/3-yr EUR
		1 155 SP bn (Korea)	1 Yr[b]
		1 155 SP bn (replacement)	1 Yr[b]
		1 155 SP bn	3-Yr CONUS[c]
8-in SP	3	2 8-in SP bns	3-Yr CONUS/3-yr EUR
		Slices of 8-in SP bns (Europe)	3-Yr EUR[c]
8-in MLRS (Europe)	4	2 8-in MLRS bns	3-Yr CONUS/3-yr EUR
		1 8-in MLRS bn (Korea)	1 Yr[b]
		1 8-in MLRS bn (replacement)	1 Yr[b]
8-in MLRS (Hawaii)	1	2 8-in MLRS bns	3-Yr CONUS/3-yr HI
		1 8-in MLRS bn (Korea)	1 Yr[b]
		1 8-in MLRS bn (replacement)	1 Yr[b]
		1 8-in MLRS bn	3-Yr CONUS[c]

[a]Each regiment includes an ERA pool to which individuals are assigned for 3 years (1 year--Korea).

[b]The OCONUS battalion disbands upon the arrival of the replacement battalion from CONUS.

[c]Individual assignments.

Section II. THE PARAMETRIC ANALYSIS

5-3. REFINEMENT OF THE STYLIZED MX REGIMENT

a. Introduction. The stylized MX regiment and the attendant analytic model underwent several modifications and refinements before a final production run was made. As a result of preliminary test runs, concept and force structure macroanalyses, and selected concerns expressed by the Army Staff and MACOM commanders relative to the Manning Task Force Concept Paper,[1] the study sponsor directed the conduct of a parametric analysis of the policies incorporated in the steady state modeling process using the stylized MX regiment. The intent was to refine selected policy choices being modeled in the MX case and clarify those policies to be modeled when analyzing the other combat arms regiments. The following paragraphs present a discussion of the parametric analysis.

b. Policies to be Analyzed. In accordance with the revised study directive (Appendix B), the parametric analysis was designed to determine the relative effects of varying policy options in the following three policy areas (referred to as Factors A, B, or C):

(1) The length of the minimum careerist stabilization in rotational units (Factor A).

(2) The scheduling of careerist opt-out and FTG fill windows (Factor B).

(3) The ERA FTG fill policy (Factor C).

[NOTE: Although listed in the tasking directive revision (see Appendix B), a fourth policy (forced reassignment of new careerists) was not included in the analysis, per agreement with the sponsor, due to irrelevancy and model limitations.]

c. Design of the Analysis

(1) Two states were possible for each of the three factors listed above. These states, developed in discussions with the Manning Task Force, are presented below.

(a) Factor A was set at 3 years for half of the model runs and at 4 years and 3 months for the other half (3-year state versus 4-year(+) state).

(b) Factor B was varied such that in half of the model runs the rotational unit experienced nonaligned careerist opt-out and FTG fill windows (as described in the Manning Task Force Concept Paper[1]); for the other half, the single CONUS and OCONUS careerist opt-out windows were aligned with the respective CONUS and OCONUS FTG fill windows (aligned versus nonaligned state).

(c) Factor C was varied such that half of the model runs employed block fill of the FTG to the ERA, while the other half employed trickle fill (block fill state versus trickle fill state). Trickle fill is defined as block fill only to ALO 1 with individual replacement whenever the ERA pool strength drops below ALO 3.

(2) The experimental design required eight (2^3) model runs to examine each combination of factor options.

(3) Based on several discussions with representatives of the Manning Task Force, measures of effectiveness and measures of cost (MOE/MOC) were developed by which the factors would be judged. Standard statistical methods (i.e., analysis of variance (ANOVA) and hypothesis testing) were then used to determine the relative magnitude of the factor effects on the MOE/MOC and the relative importance, in terms of MOE/MOC, of the various option choices.

d. Results of the Parametric Analysis. Table 5-6 presents the MOE/MOC used for the analysis, the ranking (in terms of effect on the MOE/MOC) of the three factors, and the factor interactions. Where no ranking and/or no interaction is shown in the table, the factor effects and/or interactions were insignificant (at the .05 level of significance).

(1) Factor B, alignment versus nonalignment, was found to have the most effect on the MOE/MOC. There were statistically significant differences in the values derived for most of the MOE/MOC, but the actual deviations were, in most cases, too small to be considered important. The most important effects observed for Factor B were:

(a) The nonaligned states achieved a higher level of unit stability over the FTG fill windows.

(b) The aligned state significantly reduced the average rotational unit critical shortfall of trained personnel, raised the percentage of time the rotational unit is above ALO 3 in CONUS, and significantly reduced the Europe ERA turnover rate.

(c) An important observation was that the differences in the expected number of individual PCS during a career of 20 or more years were not large; however, the aligned case caused more PCS to occur at the mid-point of the CONUS rotational unit tour, thereby causing a significant disruption in location stability for the careerist with accompanying dependents.

Table 5-6. Ranked Factor Effects and Factor Interactions

Measures of effectiveness and cost (MOE/MOC)	Factors			Factor interactions
	A	B	C	
Two rotational battalions PCS costs[a]	3	2	1	AB
Two rotational battalions pay costs	3	1	2	AB
Two rotational battalions other costs[b]		1	2	
Two rotational battalions total costs	3	1	2	AB
Regiment (-) PCS costs[c]	2	1	3	BC
Regiment (-) pay costs	2	1		AB
Regiment (-) other costs	2	3	1	AB,BC
Regiment (-) total costs	2	1	3	
Regiment PCS costs	2	1	3	AB
Regiment pay costs	1	2	3	AB,BC
Regiment other costs	2	3	1	BC
Regiment total costs	1	3	2	AB
Annual recruit requirement		1	2	
Stability over FTG fill (CONUS)[d]	2	1	2	
Stability over FTG fill (OCONUS)[d]		1		
Homebase ERA turnover rate	3	1	2	AC,BC
Other CONUS ERA turnover rate	3	1	1	
Europe ERA turnover rate		1		
Critical shortfall during stabilized periods[d,e]		1		
Average battalion strength	3	1	2	
Percent time above ALO-3 (CONUS)[d,f]		1		
Percent time above ALO-3 (OCONUS)[d,f]	2	1	3	AB,AC
Number of losses caused by regiment overstrength		1		AB
Number of PCS for personnel with 20+ years in service		1	2	
Percent fill[d]	1	2	3	
Average regiment strength	1	3	2	AB
NCO percentage of regiment	1	1		AB

[a]All costs are for 30 years.
[b]Other includes training and Operations & Maintenance, Army (OMA) costs.
[c]Minus rotational battalions.
[d]For rotational battalions.
[e]Over all grades/MOS.
[f]For at least one grade.

(2) Factors A and C had negligible effect on the majority of the MOE/MOC. However, there were frequent, strong AB and BC interactions which indicate that neither factor involved in the interaction should be set without considering both states of the other factor. For example, the 4 year(+) state of Factor A combined with the aligned state of Factor B produces only one window in a 6-year rotational tour in which a careerist who entered the unit as other than a first termer may move to another assignment or reenlist. Consequently, the careerist in such a situation is forced into a 6-year reenlistment. The same condition holds for a slightly smaller group of the careerists in the nonaligned/4-year(+) combination, i.e., those who first enter at other than the CONUS FTG fill windows. The 3-year minimum careerist stabilization gives greater assignment flexibility in both the aligned and nonaligned states.

e. Review of Results and Policy Decisions. The initial results of the parametric analysis were presented to the Manning Task Force and the study sponsor. The majority of the ensuing discussion centered on lower unit stability (loss of careerists) occurring during the OCONUS FTG fill period and disruptive PCS patterns, both of which are characteristic of the aligned state. The other MOE/MOC are less a function of the factors evaluated than they are of grade and MOS substitution and promotion rate policies. Consequently, guidance was given to set up the MX regiment model production runs using 3-year careerist minimum stabilization, nonalignment of FTG fill and careerist opt-out windows, and block fill of the FTG to the ERA pools.

CHAPTER 6

MECHANIZED INFANTRY (MX) REGIMENT ANALYSIS

6-1. INTRODUCTION

a. The basic element of analysis used in making the evaluation of the rotation concept was the stylized regiment as described and developed in the preceding chapter. In the process of analyzing the impacts of the rotational concept, substantial amounts and types of data were generated for each of the 16 different stylized regiments. This section will provide a representative sample of the data generated for these regiments and illustrate the significant factors identified through the examination of that data.

b. The sheer volume of material generated in the study precludes its complete presentation in this report. A total data set would include one group for each of the 16 regiments. Each group of data would be similar to the sample data provided in this chapter, but expanded for completeness. The total data set has been provided to the Manning Task Force (MTF).

c. To demonstrate the performance of a stylized regiment, the MX regiment with battalions rotating between a CONUS homebase and a European deployment site will be used. The following paragraphs will provide:

- A brief restatement of the major characteristics of the MX regiment
- A review and examination of the raw data generated for the regiment
- Highlights and significant results of the analysis of the MX regiment

6-2. MX REGIMENT STYLIZATION CHARACTERISTICS. The analysis of each of the stylized regiment types (Infantry, Armor, and Artillery, by subtype) required the development of input characteristics (or parameters) which are unique to each regiment and provide the major descriptive data. These characteristics include the composition (in terms of pools representing battalions or ERA) of the regiment, the planned rotation cycles, the personnel (careerist or FTG) movement status for each pool by time step, and the maximum (ALO 1) and minimum (ALO 3) strengths by grade and MOS for each of the pools. The composition and component rotation cycles for the MX regiment are shown in Chapter 5, Table 5-3. Table 6-1, below, provides an index of the coding elements and the pool personnel movement actions used as input in describing the rotation cycles and transfer actions allowed during the simulation. These

movement actions were dependent on the pool status at each time step (e.g., stabilized, understrength, etc.) and also on various individual criteria such as time in the unit. Table 6-1 displays the various movement actions which may be assigned to a pool, and Table 6-2 presents the personnel strength criteria (maximum/minimum) for each of the pools by grade and MOS.

Table 6-1. Pool Personnel Movement Option Codes

Coding elements	Pool personnel movement
Careerists	
1	Receive only
2	Transfer out only
3	Receive and transfer
4	Stabilized
Recruits (FTG)	
0	Fill to constant maximum
1	Fill to variable maximum
2	Fill to variable minimum
3	Fill to a percent of variable maximum
4	Fill to a percent of variable minimum
5	Add a percent of variable maximum
6	Add a percent of variable minimum
7	Add a given quantity
8	Dyn mic fill (no residual FTG considered)
9	Dynamic fill (residual FTG considered)
10	No fill, unit may receive FTG transfers
11	No fill, FTG may transfer out
12	No fill, unit may receive and transfer FTG
13	Stabilized

Table 6-2. MX Regiment Minimum/Maximum Fill Criteria

	Pools	E-1 to E-4	E-5	E-6	E-7	E-8	Total
				MOS 11B			
1	MX bn	259/281	92/92	36/48	14/15	8/8	409/444
2	MX bn	259/281	92/92	36/48	14/15	8/8	409/444
3	Tk bn	0/0	0/0	0/0	0/0	0/0	0/0
4	Tk bn	0/0	0/0	0/0	0/0	0/0	0/0
5	MX bn (Korea)	22/24	8/8	4/4	1/1	1/1	36/38
6	MX bn (Korea)	22/24	8/8	4/4	1/1	1/1	36/38
7	ERA (homebase)	15/19	2/63	7/29	6/8	5/6	35/125
8	ERA CONUS	14/18	8/10	58/72	38/48	19/24	137/172
9	ERA Europe	34/43	12/14	9/11	6/8	4/5	65/81
10	ERA Korea	4/6	1/1	2/3	2/2	1/1	10/13
11	ERA PA	0/0	0/0	1/1	1/1	1/1	3/3
	Total	629/696	223/288	157/220	83/99	48/55	1,140/1,358
				MOS 11C			
1	MX bn	21/30	8/10	2/2	1/1	0/0	32/43
2	MX bn	21/30	8/10	2/2	1/1	0/0	32/43
3	Tk bn	20/33	5/8	2/2	1/1	0/0	28/44
4	TK bn	20/33	5/8	2/2	1/1	0/0	28/44
5	MX bn (Korea)	4/5	2/2	0/0	0/0	0/0	6/7
6	MX bn (Korea)	4/5	2/2	0/0	0/0	0/0	6/7
7	ERA (homebase)	2/2	0/20	0/8	0/0	0/0	2/30
8	ERA CONUS	2/2	1/1	2/3	2/3	0/0	7/9
9	ERA Europe	4/5	1/2	1/1	1/1	0/0	7/9
10	ERA Korea	1/1	0/0	0/0	0/0	0/0	1/1
11	ERA PA	0/0	0/0	0/0	0/0	0/0	0/0
	Total	99/146	32/63	11/20	7/8	0/0	149/237
				MOS 11H			
1	MX bn	40/43	6/6	6/6	3/3	0/0	55/58
2	MX bn	40/43	6/6	6/6	3/3	0/0	55/58
3	Tk bn	0/0	0/0	0/0	0/0	0/0	0/0
4	Tk bn	0/0	0/0	0/0	0/0	0/0	0/0
5	MX bn (Korea)	4/4	1/1	1/1	0/0	0/0	6/6
6	MX bn (Korea)	4/4	1/1	1/1	0/0	0/0	6/6
7	ERA (homebase)	2/3	0/30	1/11	1/1	0/0	4/45
8	ERA CONUS	2/3	1/1	7/9	8/10	0/0	18/23
9	ERA Europe	5/6	1/1	1/1	1/1	0/0	8/9
10	ERA Korea	1/1	0/0	0/0	0/0	0/0	1/1
11	ERA PA	0/0	0/0	0/0	0/0	0/0	0/0
	Total	98/107	16/46	23/35	16/18	0/0	153/206
				CMF 11 summary			
	MOS 11B	629/696	223/288	157/220	83/99	48/55	1,140/1,358
	MOS 11C	99/146	32/63	11/20	7/8	0/0	149/237
	MOS 11H	98/107	16/46	23/35	16/18	0/0	153/206
	CMF 11	826/949	271/397	191/275	106/125	48/55	1,442/1,801

6-3. MX REGIMENTAL SYSTEM ANALYSIS

a. Introduction

(1) System performance was evaluated via a detailed high resolution simulation of individual personnel movement through a conceptualized system of pools. The specifics of the approaches and mechanics of the computer models employed are provided in their respective appendices (Appendices G thru J). Most of the high resolution output data from the various models have been recorded and stored on magnetic tapes. Abbreviated listings (still on the order of thousands of pages) of relevant data for each regiment type were also produced to summarize various statistics on a by-pool basis. Although these data formed the basis for the follow-on analysis, these are not reproduced here because of the immensity involved and the potential for confusion and misinterpretation. In addition to the basic data, additional information was generated through the use of various post-processors to summarize and aggregate statistical data. It is this consolidated portion of the information which has been provided to the MTF, and a representative sample of which is reviewed in this chapter.

(2) The following paragraphs will also present the significant results and highlights of the rotation analysis, using the MX regiment as the example. First to be addressed are the impacts of the concept on the regiment as a system, both as a whole and in terms of its component pools. Then to be discussed will be the impacts on the system in terms of personnel, stability of units (or pools), careerist stability impacts, and the flow of personnel through the system. Lastly, significant problem areas and cost implications will be presented.

b. Regimental Strength Impacts

(1) System Fill

(a) The impact on the assigned strength of the stylized regiment due to the rotation of the basic battalions (and the periodic requirement for the block fill of FTG) can be examined in terms of strength fluctuations over time. Consequently, a standard portion of the initial analysis for each regiment type centered about the time dependent system population status. The overall regimental impact, in terms of strength level variations, is illustrated in Figure 6-1, which plots the changes in the total regimental population (expressed as the percentage of maximum authorized strength) throughout the 12-year steady state time period of the simulation. This graph indicates both the cyclic nature of regimental strength changes, and the overall manning level resulting from the recruiting and management policies associated with the rotation concept. While this particular graph applies only to the MX regiment, it serves to illustrate the major factors associated with the specified rotation concept as discussed in Chapter 3.

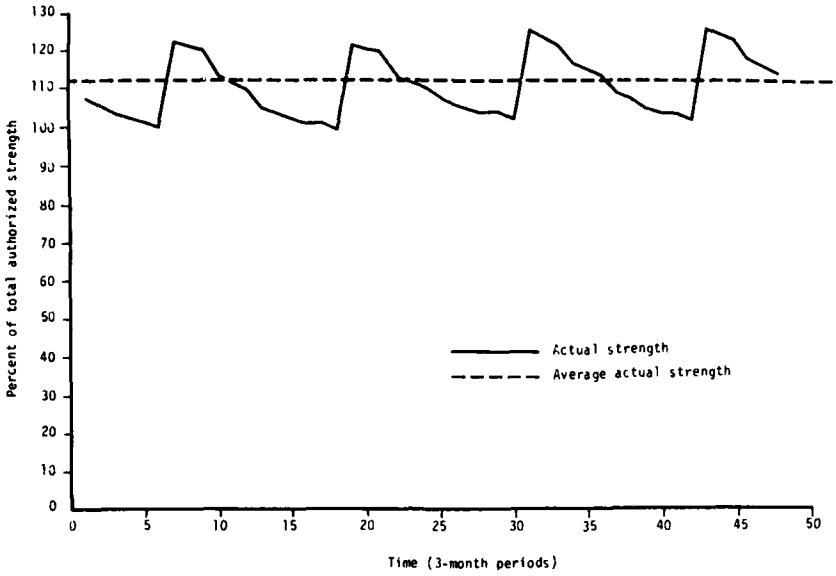


Figure 6-1. Total Strength Level Variation For MX Regiment

(b) In addition to the strength fluctuations of the total system population, the analysis focused on the system fill variations by grade within the population. The subpopulations were analyzed both with and without the use of grade substitution. Figures 6-2 through 6-8 depict the MX regiment stylization results for grades E-1 to E-4 through E-8 without grade substitution, and the results for grades E-1 to E-4 and E-5 with grade substitution. Noteworthy are the magnitude of the E-1 to E-4 strength fluctuations (from approximately 90 to 140 percent of the regimental authorization) and the overfill (averaging almost 50 percent of E-5 personnel maintained in the system. The E-5 overfill illustrates a problem caused by applying a recruiting policy which is not based on total system requirements. It is especially severe in this sample case because no allowance was made for expelling excess resources during the simulation. This was done deliberately to avoid masking the problem. Figure 6-5 shows that, even allowing for the use of grade substitution, high levels of E-5 personnel still remain. Figures 6-6 through 6-8 illustrate that the grade structure cannot absorb the excesses generated by the combination of the modeled E-1 to E-4 fill policy (block fill) and the current promotion rates.

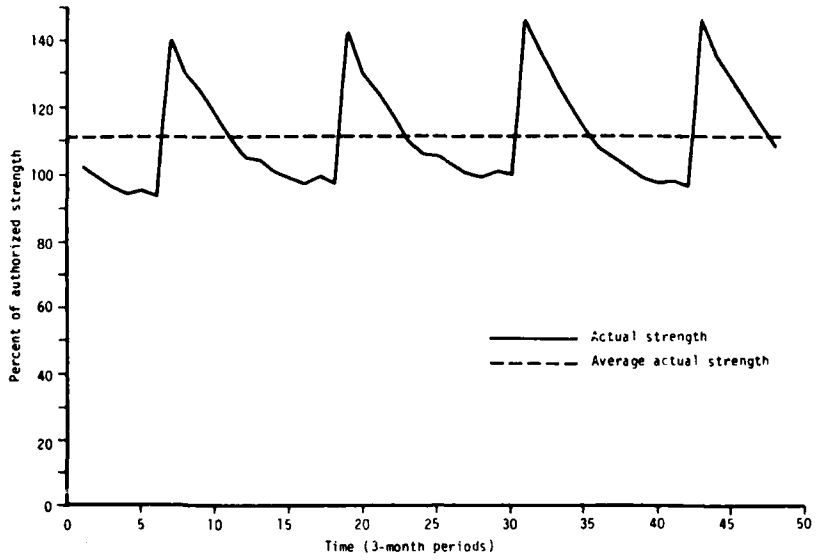


Figure 6-2. MX Regiment E-1 to E-4 Strength Without Grade Substitution

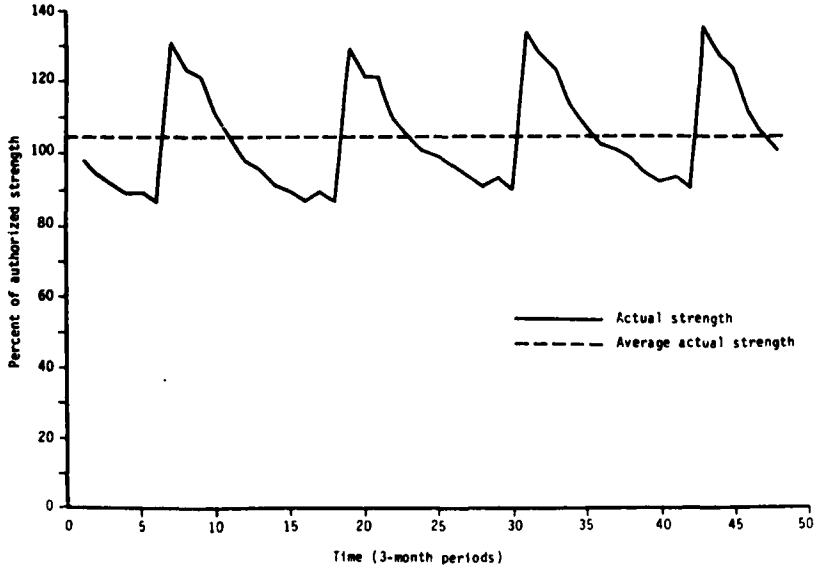


Figure 6-3. MX Regiment E-1 to E-4 Strength With Grade Substitution

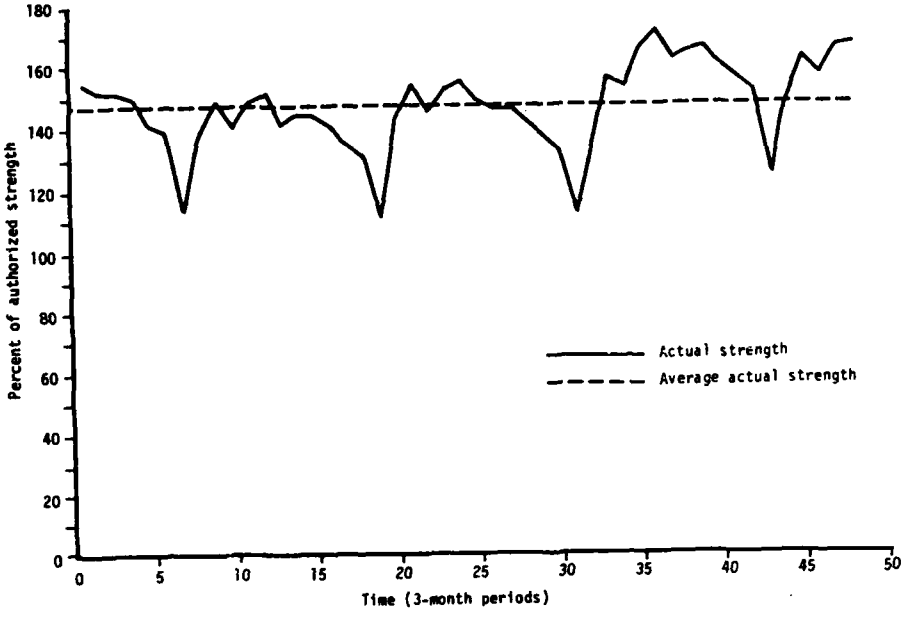


Figure 6-4. MX Regiment E-5 Strength Without Grade Substitution

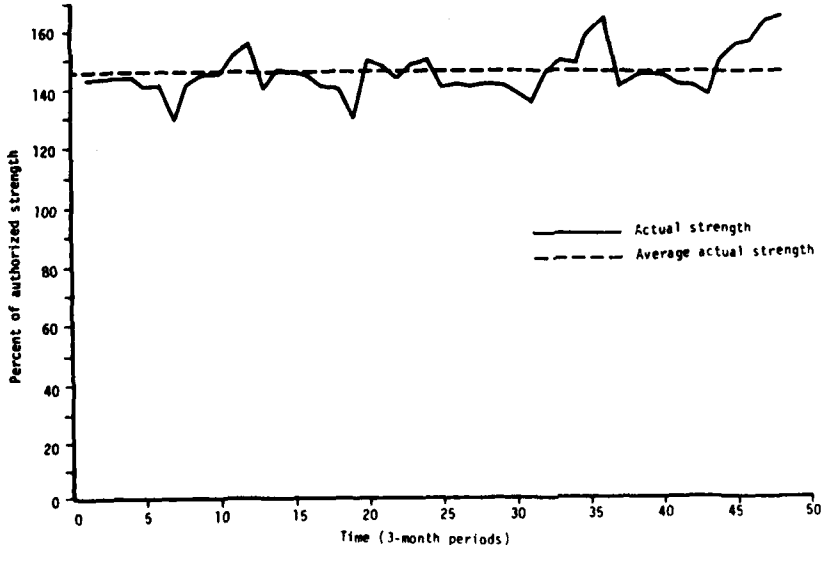


Figure 6-5. MX Regiment E-5 Strength With Grade Substitution

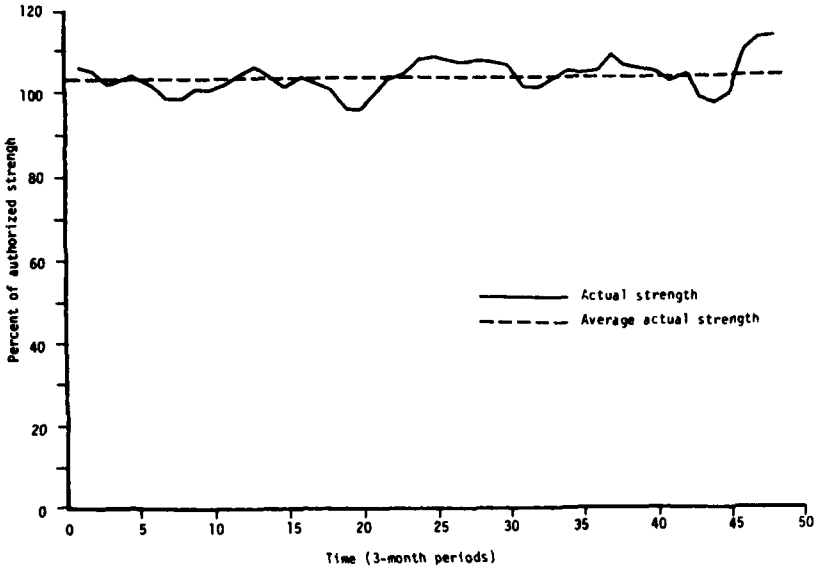


Figure 6-6. MX Regiment E-6 Strength With Grade Substitution

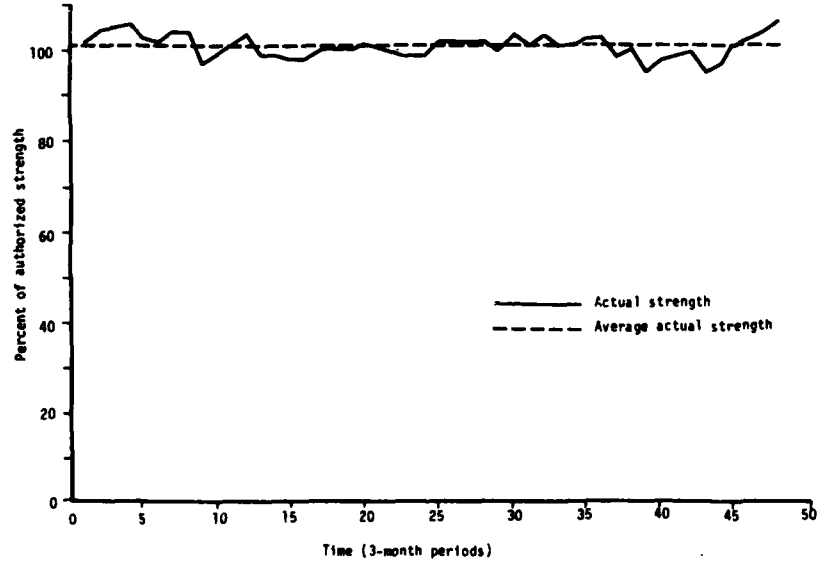


Figure 6-7. MX Regiment E-7 Strength With Grade Substitution

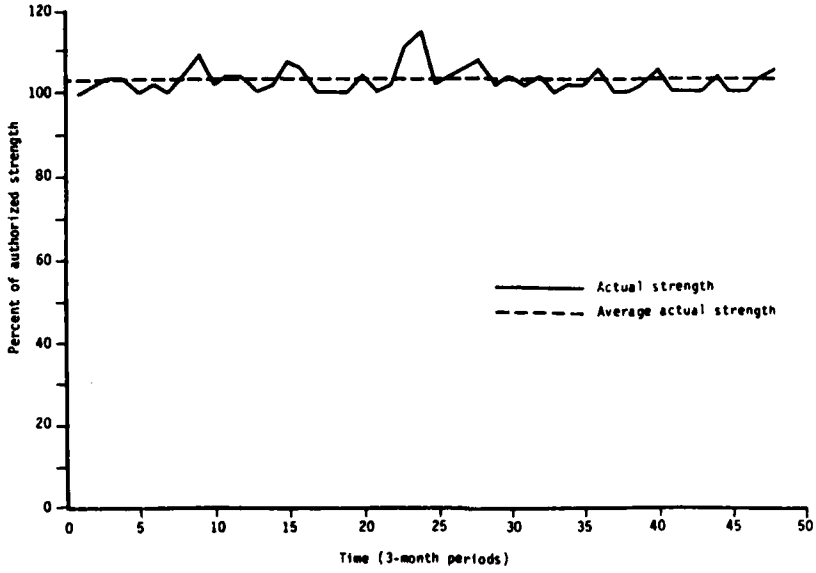


Figure 6-8. MX Regiment E-8 Strength With Grade Substitution

(2) Pool Fill

(a) The preceding paragraph addressed the system fill of the entire regiment; the same type of analysis was also performed on a by-pool basis to observe differences attributable to pool types. Among the factors used to partition the data were: grade, grade substitution, actual strength figures versus percent of authorized strength, and differentiation of careerists and the FTG.

(b) Figures 6-9 through 6-12 illustrate the stratification by pool of E-1 to E-4 strength levels over time. These figures address the fluctuation in the fill of E-1 to E-4 personnel, on a percentage basis, prior to applying grade substitution. Figure 6-9 portrays the changes with time as experienced in Pool 1, the MX battalion. This graph displays the impact of the rotational policies on the actual deploying unit (as opposed to Figure 6-1 which considered the entire regiment). Particularly noteworthy in this graph is the magnitude of the difference between the high and low points. The highs occur at the designated fill points, and the lows remain above the policy mandated ALO 3 minimum target strength. Further, the dashed line illustrates the overall impact on the average manning level attributable to the block fill procedure, which fills units above optimum level. This shows that the basic FTG fill procedure (block fill) will require additional manpower and increase turmoil both during and immediately following the FTG fill window.

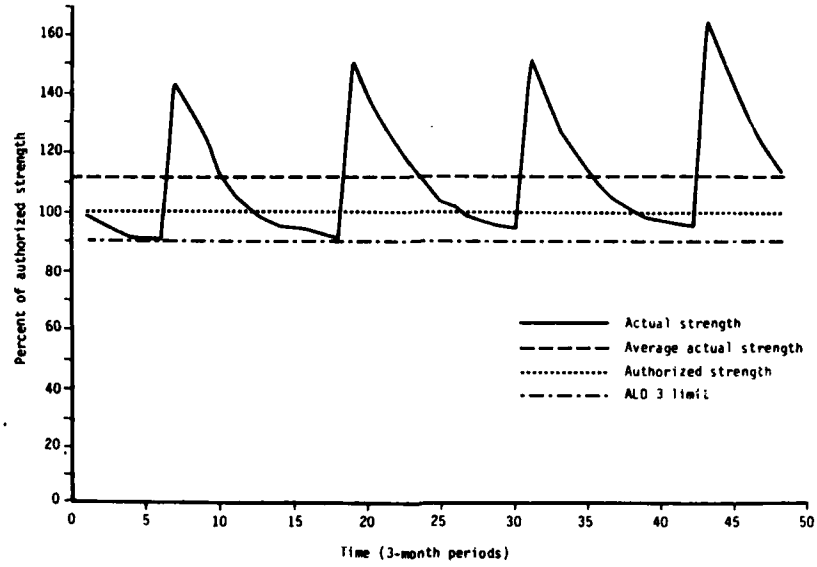


Figure 6-9. MX Battalion E-1 to E-4 Strength Without Grade Substitution

(c) Figures 6-10 through 6-12 also address the E-1 to E-4 fill, but are drawn for different pools in the regiment. Figure 6-10 portrays the behavior exhibited by the Korea replacement unit (composite MX/tk bn) during the 12-year period. (Recall that in this instance replacement units are assembled and disestablished on a 2-year basis.)

(d) Figure 6-11 illustrates the conditions in Pool 7, the CONUS ERA pool located at the homebase. In this case, a sustained overfill is evident. This overfill is primarily due to two conflicting factors. First, the personnel grade distribution in the ERA pools is biased toward the higher grades (i.e., the percentage of E-1 to E-4 and E-5 slots in the ERA pool populations is much smaller than the percentage in the battalion pools). Second, a significant portion of those E-1 to E-4 personnel returning from OCONUS assignments are transferred to the homebase ERA pool if no other preferable assignment is available. These factors combine to make this pool a reservoir for excess recruits and result in the conditions shown in the graph.

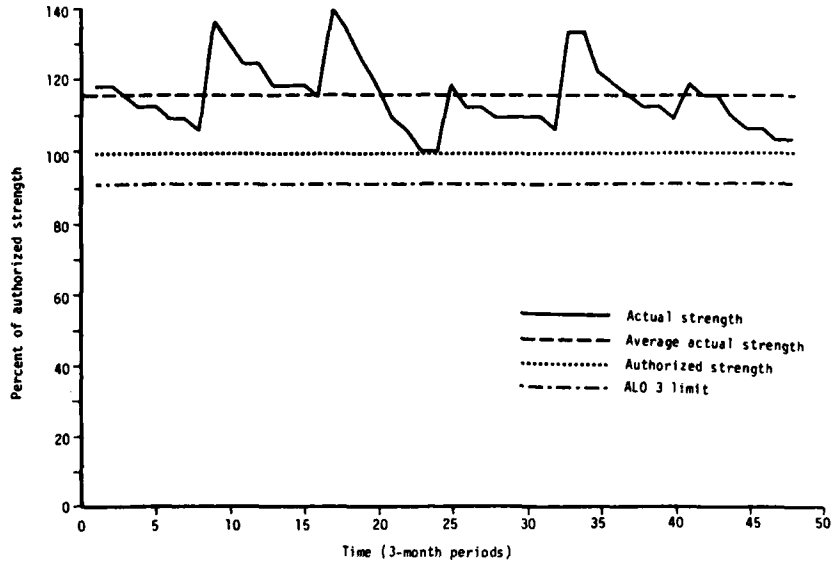


Figure 6-10. Korea Replacement Unit E-1 to E-4 Strength Without Grade Substutition (MX regiment)

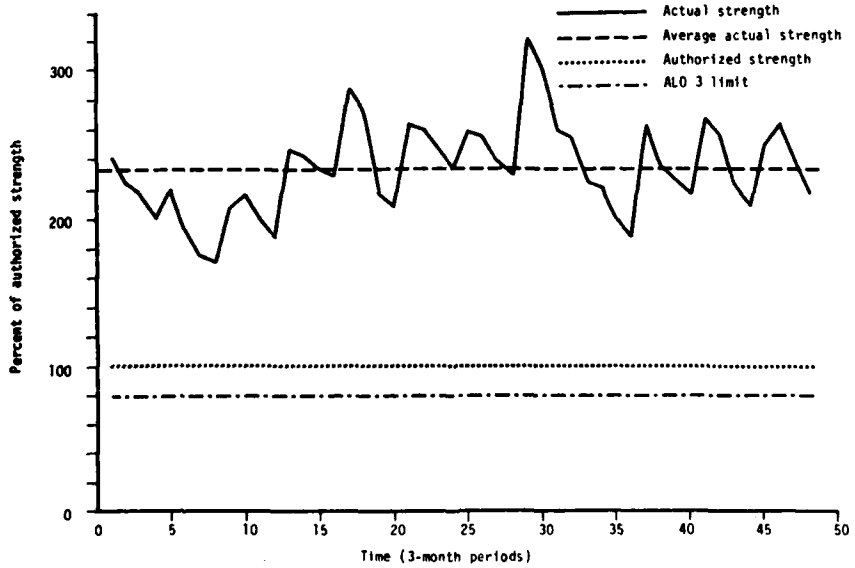


Figure 6-11. CONUS ERA (homebase) E-1 to E-4 Strength Without Grade Substitution (MX regiment)

(e) The overfill status indicated in Figure 6-11 can be contrasted to the status of Pool 8 (the Other CONUS ERA pool) as shown in Figure 6-12. Although Pools 7 and 8 are approximately equal in their authorized E-1 to E-4 strengths, Pool 8 does not exhibit any similar marked overfill because it is not used as a reservoir for excess personnel, as was the case for Pool 7. The overfill noted for Pool 7 is on a percentage basis. When the actual small strength authorization is taken into account, the problem is seen in perspective as less severe (see Table 6-2).

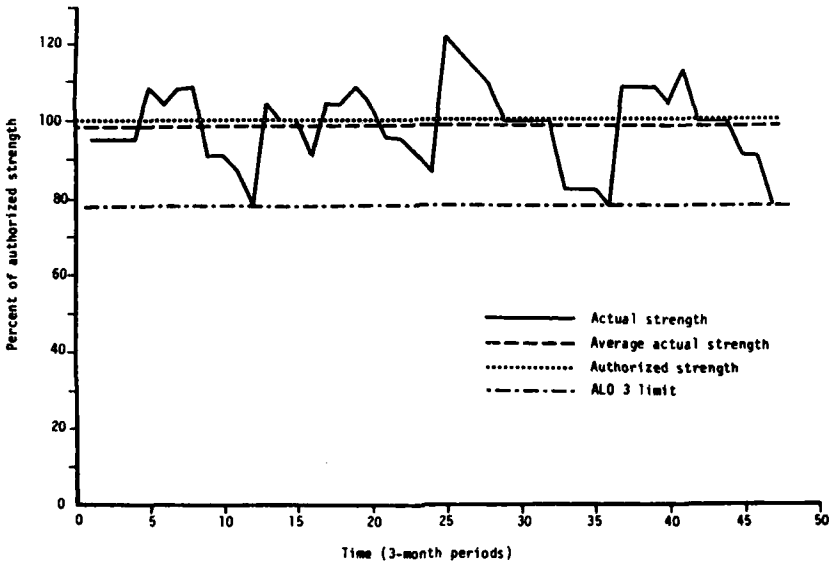


Figure 6-12. Other CONUS ERA E-1 to E-4 Strength Without Grade Substitution (MX regiment)

(f) Although only four of the pool fill status graphs have been reviewed in this section, the review does serve to illustrate the type of information that has been generated and the types of insights that can be gained from analysis of the data. Similar and more extensive data was generated for each of the stylized regiments and has been made available to the MTF.

c. Extracted Statistical Data. In the previous subparagraphs, the references were to raw data, i.e., categorization and plotting of the simulation status data. In addition to this material, statistical data was extracted to provide additional insights and to generate certain specific parametric data requested by the MTF. This subsection provides examples of the additional data and analyses for the MX regiment.

(1) Personnel Stability

(a) An anticipated benefit of the rotation concept is that the cohesion of the unit, and a personal sense of unit identity, will increase. To determine the extent to which personnel assigned to the rotating battalions (and the other pools, for that matter) have an opportunity to establish a more long-term relationship with the unit, a special review of the raw data was made. The results of that review are illustrated in Figures 6-13 through 6-18 and are discussed below.

(b) The graphs used in Figures 6-13 through 6-18 indicate the continuity within a pool by showing what portion of that pool's authorized strength has, at any point in time, been associated with it for a period of at least 18 months. The choice of 18 months is subjective but was deemed an acceptable discriminator in identifying personnel who would have some strong sense of unit affiliation.

(c) For greater detail, the personnel assigned to the pools were subdivided into two separate groups. Figures 6-13 and 6-14 indicate the behavior of the personnel strength in the MX battalion. From Figure 6-13, it is apparent that the group of policies associated with the rotation concept, as applied, have been successful in achieving stability (and the consequent unit identity and cohesiveness) for experienced careerist personnel in the battalion. In the case of the E-1 to E-4 personnel in the battalion, as illustrated by Figure 6-14, it is evident that block fill results in alternating periods with high and low levels of experienced personnel. This is intuitively expected as, given an uninterrupted assignment, all of the block filled FTG reach the 18-month time-in-unit point simultaneously and cause the abrupt rise in the statistic. When this group reaches the three year point, there is a large decrease in strength due to separation losses and/or transfers. Subsequent to that point, the strength of the E-1 to E-4 group continues to decrease because of promotion to a higher grade, and it is not until the next block of FTG reaches 18 months in the unit that the strength level again increases (again dramatically).

(d) Figure 6-13 also provides an indication of the personnel stability in the unit. The level of experienced personnel does not drop below approximately fifty percent, and averages considerably higher. In the case of the E-1 to E-4 personnel, however, the unit fluctuates severely between high and low levels of personnel stability by the very nature of the FTG block fill action. This is shown in Figure 6-14. This figure may be misleading, however, because it is based on an 18-month stability criterion. Reducing this criterion value would result in decreasing the length of the periods at low stability levels, and the resultant graph may lead to different observations.

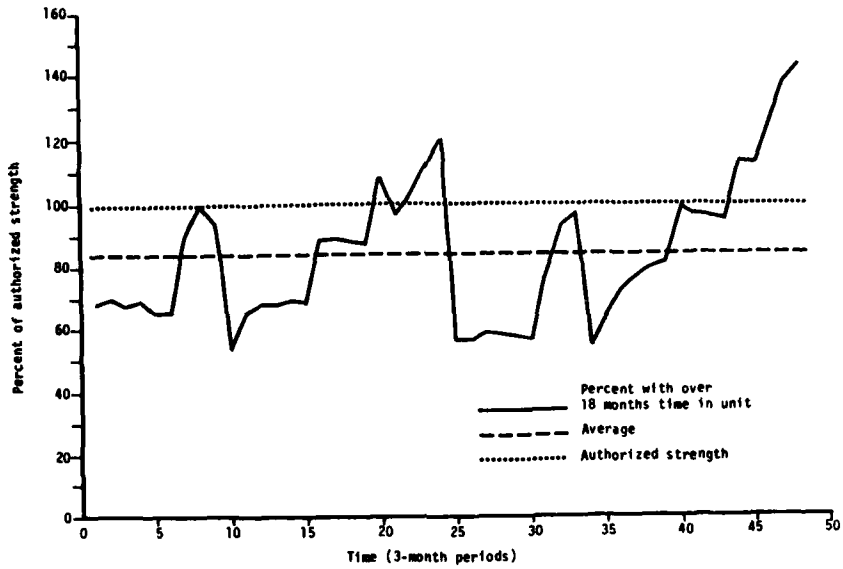


Figure 6-13. MX Battalion E-5 to E-8 Strength With at Least 18 Months in Unit

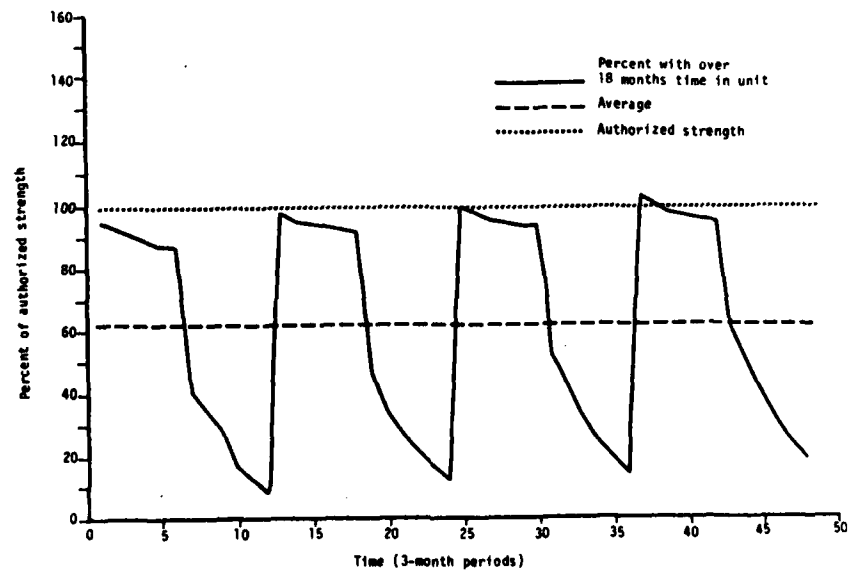


Figure 6-14. MX Battalion E-1 to E-4 Strength With at Least 18 Months in Unit

(e) Figures 6-15 through 6-18 portray the personnel stability of the CONUS ERA (homebase) and other CONUS pools. Note that the CONUS ERA pools are unable to achieve the stability levels of the rotational units. This is due to the burden on the ERA pools of supporting all the other personnel movement actions ongoing in the regiment, which can be expected to result in unusually high turnover rates. These graphs are an additional indication of the extent to which the stability and cohesiveness of the unit assignments are purchased at the expense of the ERA pools.

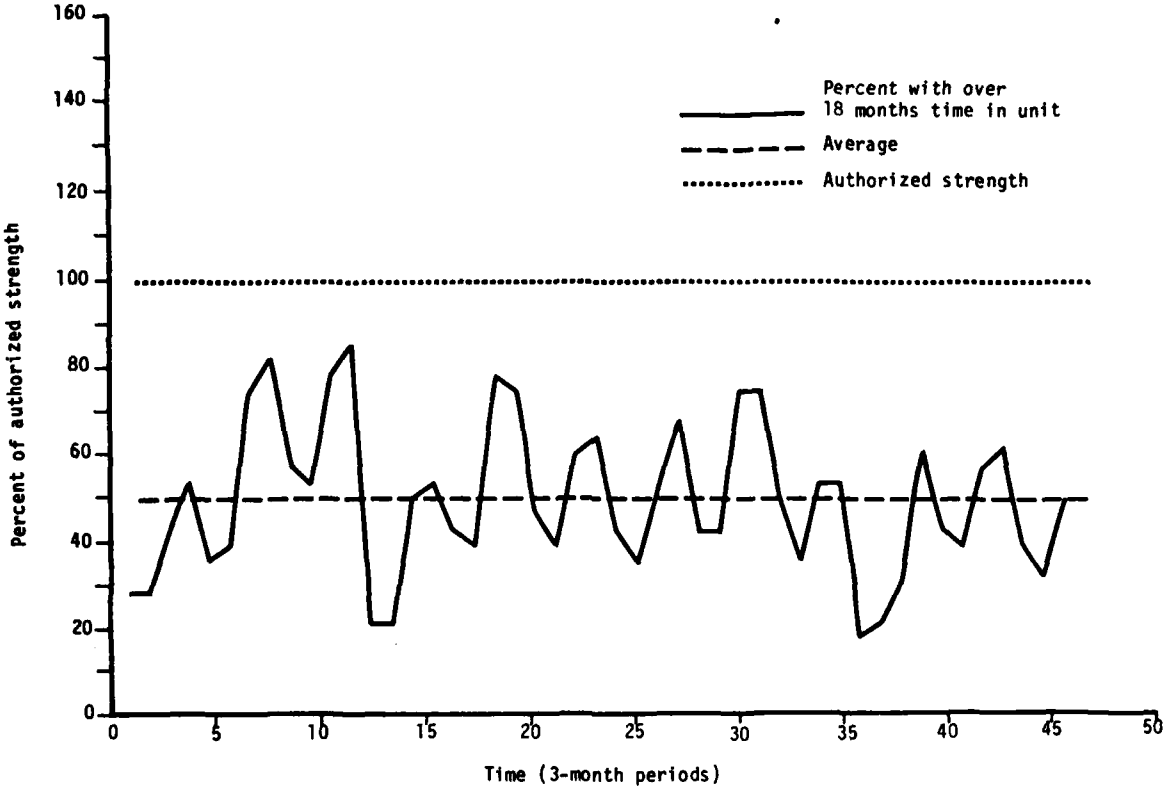


Figure 6-15. CONUS ERA (homebase) E-5 to E-8 Strength With at Least 18 Months in the Unit

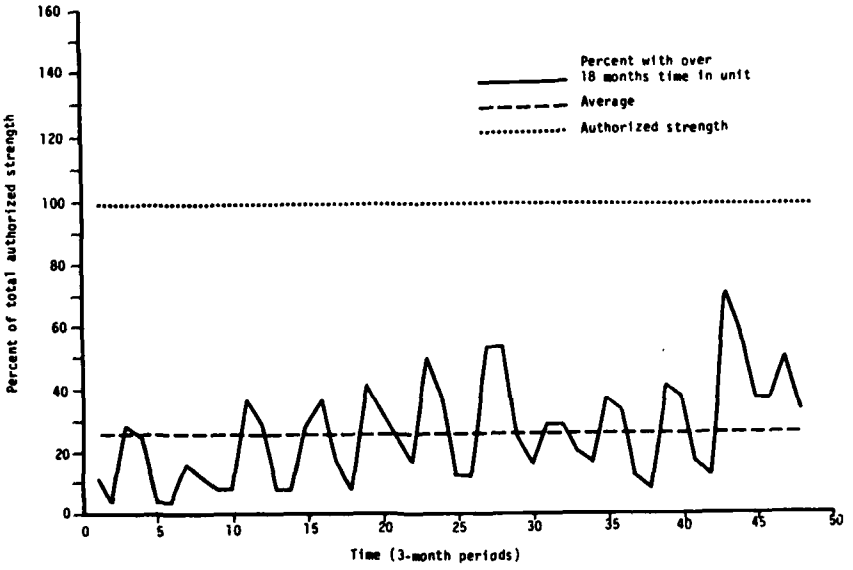


Figure 6-16. CONUS ERA (homebase) E-1 to E-4 Strength With at Least 18 Months in the Unit

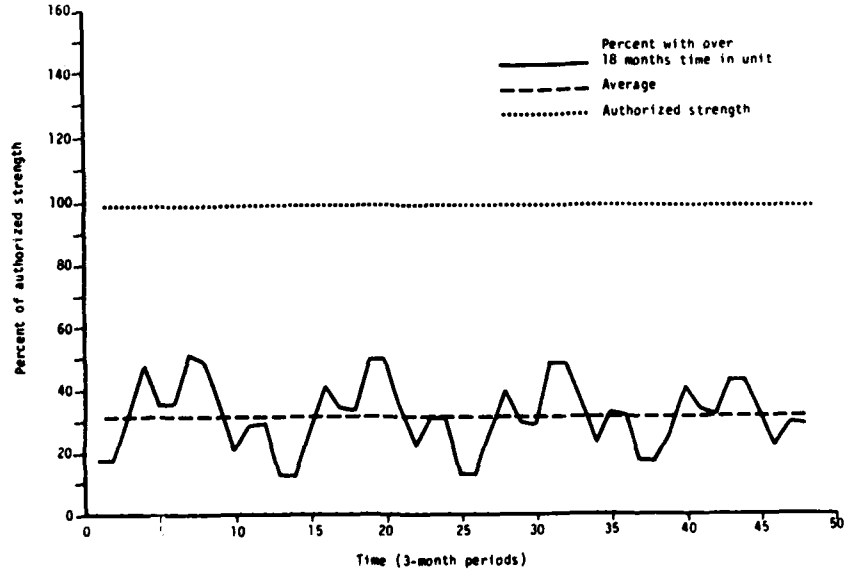


Figure 6-17. Other CONUS ERA E-5 to E-8 Strength With at Least 18 Months in the Unit

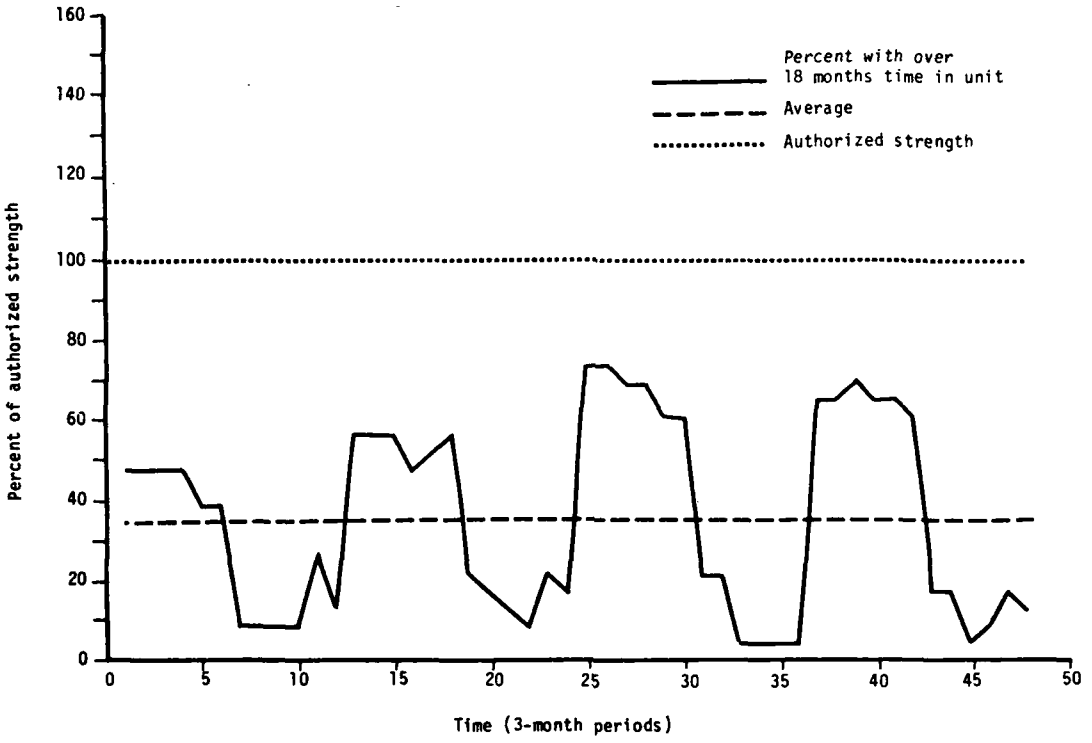


Figure 6-18. Other CONUS ERA E-1 to E-4 Strength With at Least 18 Months in the Unit

(2) Impact on the Careerist

(a) By request of the MTF, the analysis of the rotational concept was to provide certain statistical data reflecting the impact on the careerist of the proposed policies. To provide this information the movements in the simulation were analyzed, and statistical data was extracted by computerized postprocessors on a by-grade basis for each stylized regiment. A listing of the types of parametric data collected is provided in Table 6-3. For each statistic of concern, the measures provided were the mean value, minimum and maximum individual values, and the standard deviation of the sample.

Table 6-3. Parametric Data Provided to Manning Task Force[a]

1. Number of rotational tours
2. Number of homebase tours
3. Number of short tours
4. Percent of time spent in the unit
5. Percent of time spent at the homebase
6. Percent of time spent in CONUS
7. Percent of time spent OCONUS
8. Average rotational unit tour length
9. Average homebase tour length
10. Average CONUS tour length
11. Average OCONOUS tour length
12. Number of CONUS tours
13. Number of OCONUS tours
14. Time spent in ERA assignments
15. Total time spent in the service
16. Total time spent in the unit
17. Total time spent at the homebase
18. Total time spent in CONUS
19. Total time spent OCONUS
20. Probability of return to the homebase

[a]Data were provided for each regiment type by grade.

(b) A reduced selection of statistics (mean values only) is provided in Table 6-4. Of particular interest are the percent of time spent in the unit as grade increases and the comparison of CONUS to OCONUS time as grade increases. Both of these factors are related to the difference in the grade distributions between the battalion and ERA assignments. For the MX regiment, Figure 6-19 graphically illustrates the change in grade authorizations. As can be seen, at the higher grades, more of the authorized slots are in the ERA pools, and therefore in these grades a greater proportion of the time must be spent out of the unit. Similarly, since the majority of ERA slots are in CONUS, as grade increases the ratio of CONUS to OCONUS time also increases.

Table 6-4. MX Regiment Career Statistics

Grade	Rotational unit tour length (yrs)	Time in units (%)	Time at homebase (%)	Time in CONUS (yrs)	Time in OCONUS (yrs)	No of short tours
E-1 to E-4	3.2	87.6	45.0	2.0	1.9	0.1
E-5	4.4	75.5	49.7	4.3	3.3	0.2
E-6	5.0	67.7	46.6	7.4	4.8	0.4
E-7	4.8	60.4	42.6	10.1	5.9	0.6
E-8	4.8	52.7	38.8	14.0	7.4	1.0

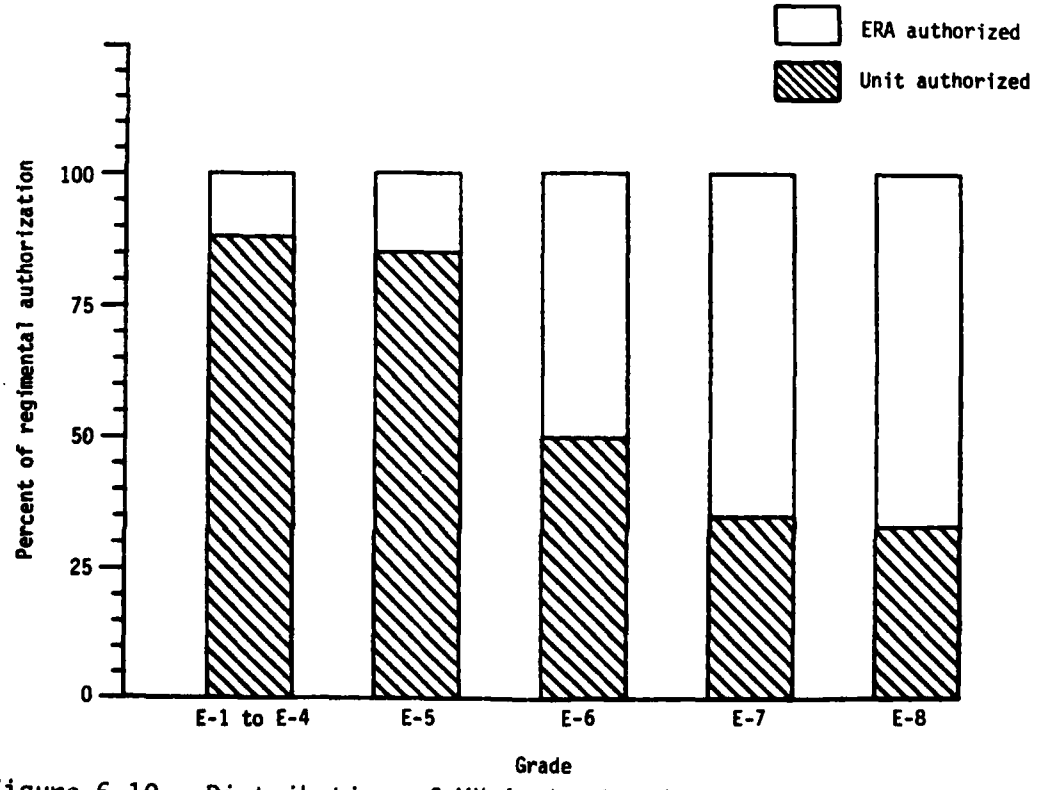


Figure 6-19. Distribution of MX Authorization to ERA and Unit Assignments

(c) The preceding is a sample of the type of data produced. The package of data provided to the MTF includes a set of the 20 tables for each of the 16 stylized regiments and one set for each CMF.

(d) In addition to the summary statistics, certain statistics were examined at a greater level of detail, e.g., by time period. Significant were the amount of time which careerists with more than 20 years of service have spent at the homebase and the number of PCS these individuals have undergone during their careers. Figures 6-20 and 6-21 illustrate these distributions.

(3) Personnel Flow

(a) The output generated by the simulation of the steady state for each stylized regiment also provided information on the flow of the personnel through the regimental system. Figure 6-22 shows a summary of the by-pool distribution of the new FTG for the MX regiment. This figure illustrates the extent to which the rotating units serve as a funnel through which the new FTG must pass to man the remaining regimental structure. This is so because the major demand for E-1 to E-4 personnel is in the rotating units.

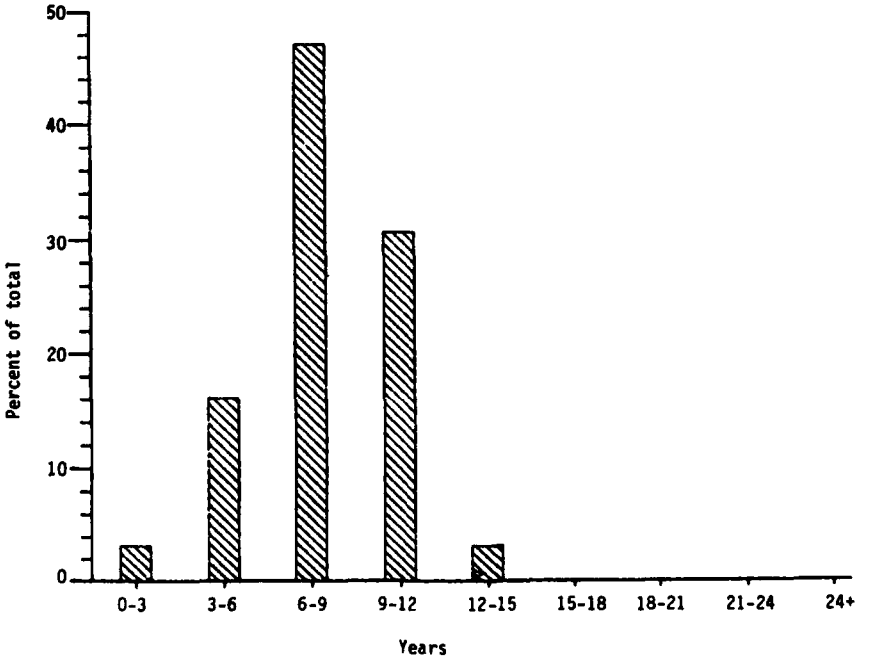


Figure 6-20. Distribution of Time at Homebase for Careerists (with 20 or more years of service)

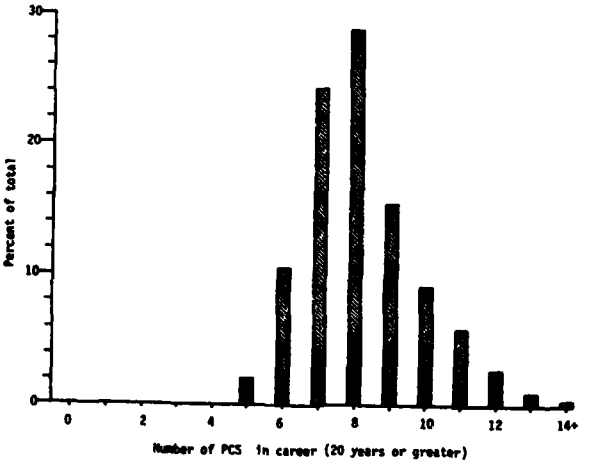


Figure 6-21. Distribution of Number of PCS for Careerists (with 20 or more years of service)

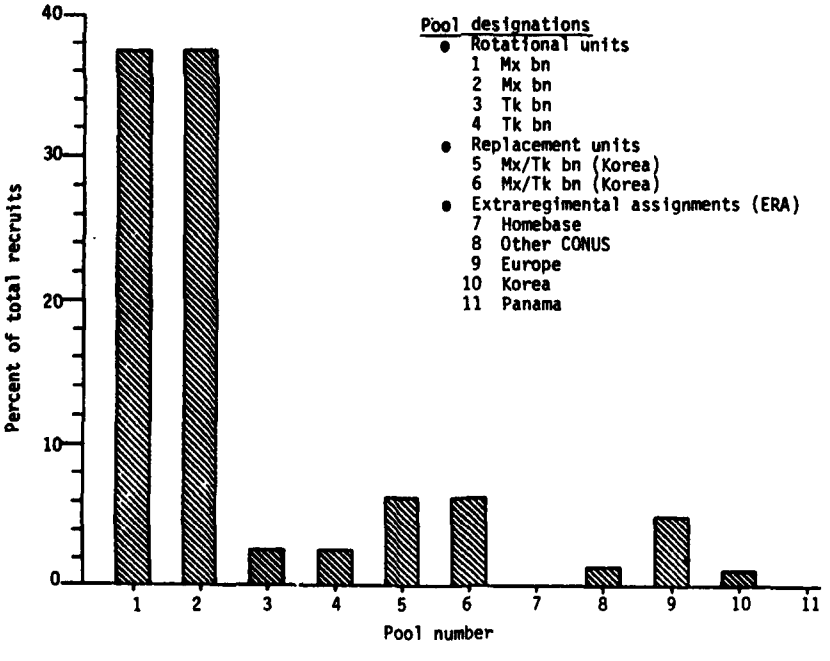


Figure 6-22. Distribution of the FTG in the MX Regiment

(b) To simplify the computer output of movement to and from pools, a graphical representation scheme was devised which grouped the pools, and then indicated movements both between different groups and between pools within the same group. In Figure 6-23, the individual pools are represented by circles, with the area of each circle proportional to the authorized strength of the pools. The arrows represent the transfers between pools and groups of pools, with the width of each arrow being proportional to the number of transfers. Both FTG and separatees are also shown, again with the width of the arrows proportional to the respective quantities of each.

(c) Examination of Figure 6-23 reveals that no transfers occur directly from one pair of rotating units (MX battalion and associated tank battalion slice) to the other. Also, given the relatively small size of the two CONUS ERA pools, the total traffic to and from those pools is considerable. This follows from the intricacies of the rotation scheme which work to inhibit movement directly from one rotating unit to another. Movements to and from rotating units must be funneled through the CONUS ERA pools because the windows for careerist movement do not coincide. Such being the case, the ERA pools are subjected to high turnover rates. They serve as both the primary source for replacement action careerists and as the vehicle for movement between units.

(d) Figure 6-23 can be especially useful for comparing the flow patterns that develop for different rotation/replacement concepts. This particular diagram is peculiar to the MX regiment, but the data and preliminary diagrams for the other stylized regiments have also been developed and presented to the MTF.

6-4. MAJOR REGIMENTAL IMPACTS. From the data generated in the simulation of the stylized MX regiment, certain major factors were identified. This paragraph reviews these factors: the block fill impact, the grade structure/distribution imbalances, and unit stability and cost considerations.

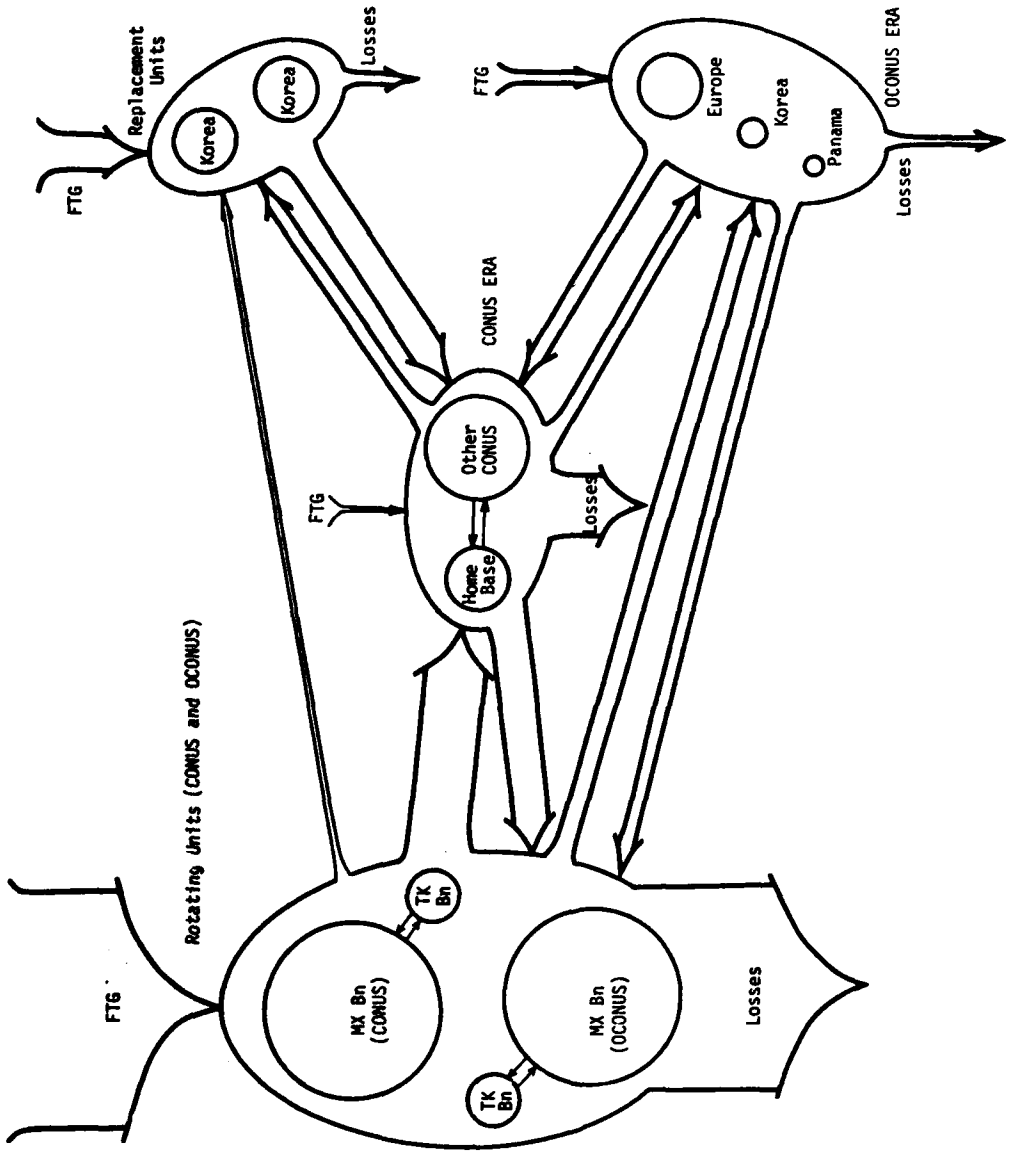


Figure 6-23. MX Regiment Personnel Flow

a. FTG Block Fill

(1) The consequences of relying on infrequent fill of new personnel, while simultaneously designating an absolute lower limit of E-1 to E-4 personnel, are unavoidable. Maintaining the lower limit (ALO 3) with block fill will cause the average manning level to increase. Figures 6-1 and 6-2 provide an indication of the most significant associated penalties. For the stylized MX regiment, the penalties imposed by utilizing block fill every 3 years are an increase in the average manning level of approximately 10.8 percent above the authorized strength and a periodic fluctuation in total strength amounting to approximately 20 percent. For the battalions themselves, these impacts are even more severe.

(2) To some extent, these impacts can be eased by using a more sophisticated procedure for determining FTG fill requirements. One alternative, for instance, may be to take into account the overall unit and regimental status, rather than react only to the unit E-1 to E-4 status. The main point, however, is that even though minor efficiencies can be effected, utilization of block fill will result in the generation of substantial personnel level increases and large periodic surges in strength. These effects are reflected most intensely in the regimental E-1 to E-4 positions and are especially severe in the rotating battalions.

b. Grade Structure/Distribution

(1) During the course of the analysis, it became evident that difficulty was being encountered in the simulations due to modelled versus authorizated strength mismatches in particular grades. The structure of the stylized regiment, in terms of authorized strength grade distribution, was compared with the distribution that could be expected to result given current personnel promotion and attrition rates. Figure 6-24 graphically compares the theoretical and authorized strength distributions of the stylized MX regiment by grade. If the total theoretical and authorized strengths were equal, the indications are that the distribution generated by current promotion/attrition rates would show an overfill of E-1 to E-4 and E-5 personnel and a shortage at the higher grades.

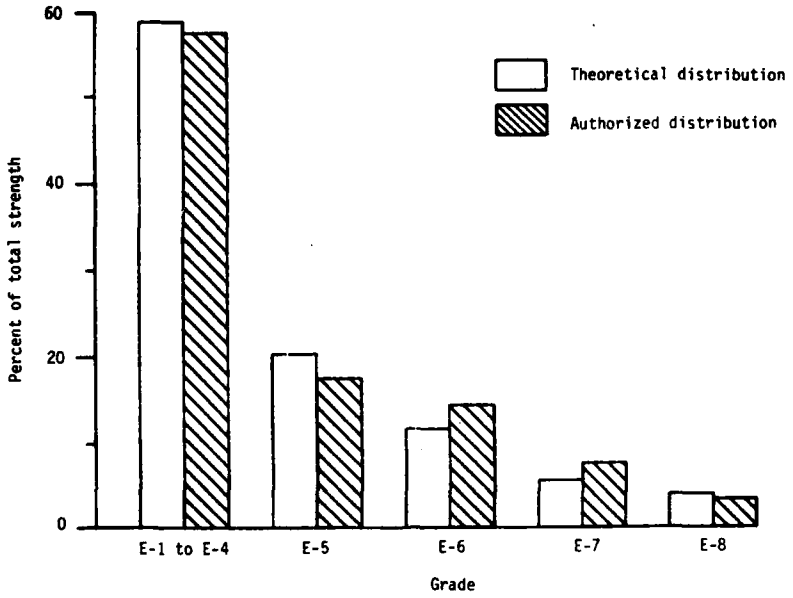


Figure 6-24. Theoretical vs Authorized Strength Distribution - MX Regiment

(2) The preceding grade structure analysis addressed the percent distribution of grades rather than the strength of each grade and does not clearly display the grade structure difficulties caused by the block fill philosophy. In the simulation the total modelled strength in the regiment averaged not 100 percent, but approximately 110.8 percent. When this inflated manning level is compared with the authorized strength distribution, the grade structure difficulties encountered in the simulations are more evident. Figure 6-25 compares the observed average regimental strengths with the respective authorizations. Note the E-1 to E-4 and E-5 overfill and the E-6 to E-8 underfill. When the data is adjusted to compensate for grade substitution flexibility (see Figure 6-26), the E-6 to E-8 underfill is corrected, but the authorized grade structure, even with grade substitution, is unable to cope with the inflated E-1 to E-4 and E-5 manning level.

(3) As noted in paragraph 6-4a, a revised and more accurate procedure (perhaps based on a total system manning level criteria) might reduce the overfill. There would still be some unavoidable penalty of excess personnel. Figures 6-24 through 6-26 indicate that the greatest problem, in terms of grade structure/distribution, will probably be centered on the E-5 overfill and the resulting grade substitutions.

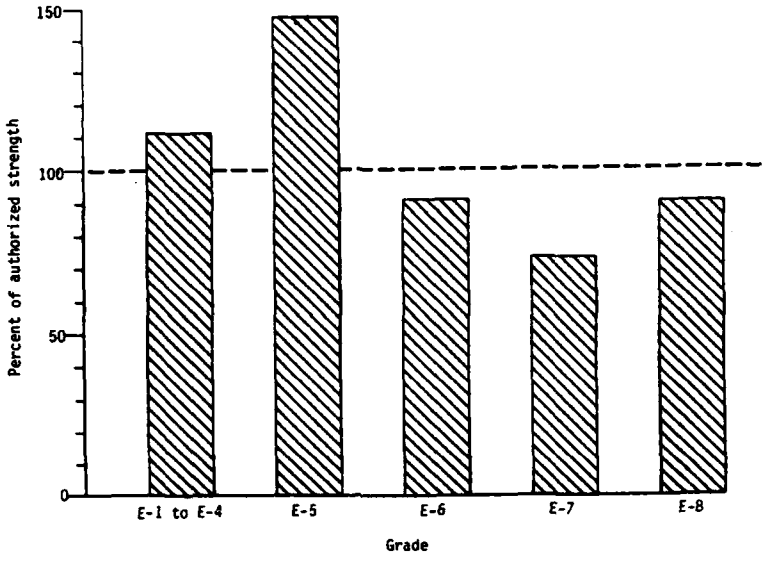


Figure 6-25. Actual vs Authorized Strength for MX Regiment Without Grade Substitution

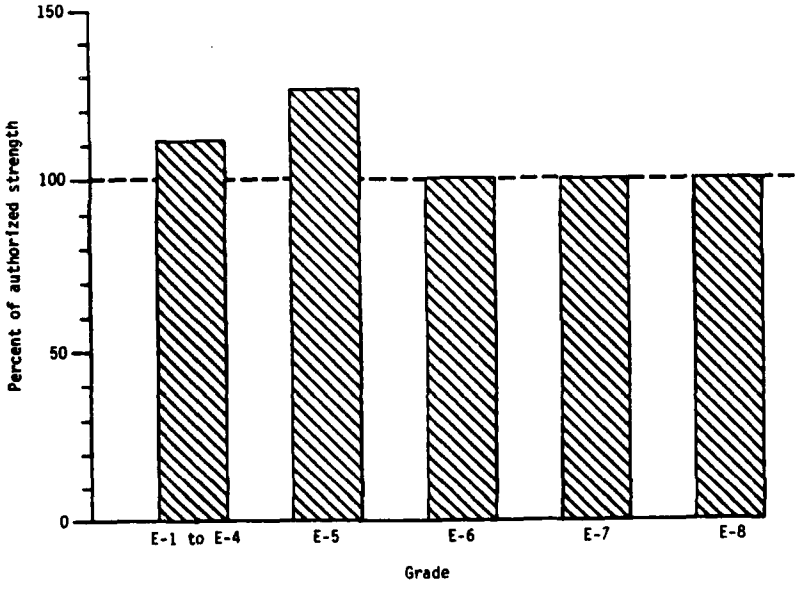


Figure 6-26. Actual vs Authorized Strength for MX Regiment With Grade Substitution

c. Unit Stability

(1) To gain the greatest potential benefit from unit rotation, it would be hoped that the resulting personnel flows would produce acceptable levels of unit cohesion and identity. The preceding discussion of model output has addressed pool stability, and Figures 6-13 and 6-14 have illustrated the extent to which the unit is manned with experienced personnel. The rotation concept increases personnel and unit stability as compared to individual replacement (at the expense of high turnover rates in the ERA pools).

(2) The principal focus of unit stability, however, is the extent to which the unit is afforded extended periods during which minimal turbulence occurs. The rotation scheme was designed to achieve that goal, and as Figure 6-27 indicates, the goal appears to have been reached. Although the figures indicate an average annual turnover rate (i.e., percent of average strength departing in a 1-year period) of 24.0 percent for the unit, the graph clearly illustrates that the major portion of the turnover is confined to the intended turnover periods. During that portion of the year when the unit is supposed to be stabilized, the turnover averages only 6.7 percent. Only in those periods when the unit is intended to undergo major personnel movement does the turnover rate become significant.

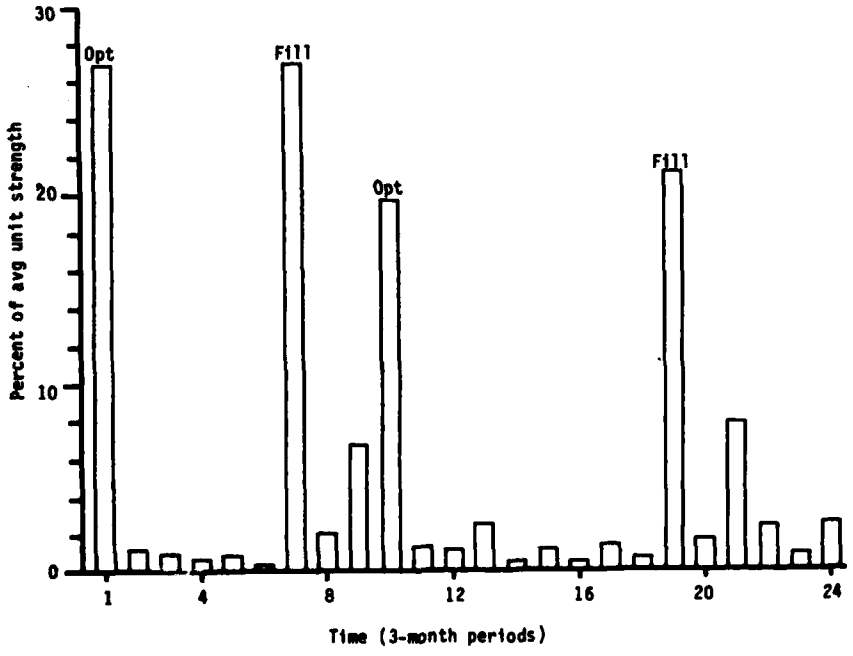


Figure 6-27. Percent Turnover per Quarter in MX Battalion

(3) Finally, it must be noted that while lower turnover rates during the stabilized periods have been achieved for the units, the same cannot be said for the ERA pools. As discussed in Chapter 4, the grouping of the units in a rotation scheme can place an increased burden on the ERA pools. This is the case in the MX regiment stylization; while the annual turnover rate for the unit pools is 24.0 percent, it averages 50.0 percent in the CONUS ERA pools. This result is consistent with the indications of the personnel flow diagram of Figure 6-23, which show that there is no flow from one pair of battalions to the other. The major avenues of movement are through the CONUS ERA pools.

d. Cost Implications. An overview of the dollar cost implications of the proposed unit rotation concept versus the current individual replacement concept for the MX regiment is presented below. The details of the procedures and inputs used in generating cost data are provided in Appendix L.

(1) In general, the procedure used developed the applicable costs for battalion personnel (CMF 11 enlisted only). The costs were then extended to cover the remaining regimental personnel (CMF 11 enlisted only).

(2) Tables 6-5 and 6-6 were obtained from the data in Appendix L and summarize the cost comparisons on a two-battalion basis and a regimental basis, respectively.

Table 6-5. Total Costs for Two MX Battalions (CMF 11 enlisted only) (30-year costs in millions of FY 81 constant dollars)

Category	Individual replacement		Unit rotation	
	FORCOST	RPFM	$IR[a]	PBO est[b]
Strength	1,080	1,121	1,167	1,167
Pay and allowances	$376	$407	$427	$427
PCS	32	44	43	34
Other[c]	198	203	207	207
Total cost	$606	$654	$677	$668

[a]$IR = individual replacement cost. Cost per PCS is assumed to be the same as that of individual replacement.
[b]Cost per PCS obtained from ODCSPER Program and Budget Office (PBO).
[c]Includes training costs and all operations and maintenance, Army (OMA) costs.

Table 6-6. Total Costs for MX Regiment (CMF 11 enlisted only) (30-year costs in millions of FY 81 constant dollars)

Category	Individual replacement	Unit rotation	
	RPFM	$IR[a]	PBO est[b]
Strength	1,495	1,832	1,832
Pay and allowances	$548	$696	$696
PCS	52	56	47
Other[b]	277	330	330
Total cost	$877	$1,082	$1,073

[a]$IR = individual replacement cost. Cost per PCS is assumed to be the same as that of individual replacement.

[b]Cost per PCS obtained from ODCSPER Program and Budget Office (PBO).

[c]Includes training costs and all operations and maintenance, Army (OMA) costs.

(3) A comparison with individual replacement shows that total costs increase under unit rotation. The cost increase incurred is primarily a result of the increased manning levels. While the number of PCS is expected to increase under unit rotation, the PCS cost increase did not contribute significantly to the total costs. On the average, PCS costs constitute only about 5 percent of the total costs for a regiment, so over the range of anticipated possible increases (0 to 40 percent depending on parametric PCS cost assumptions), the net impact is small. The remaining 95 percent of costs are attributable to pay and allowances, training, and all OMA costs.

(4) The effectiveness of refinements in manning procedures to reduce overfill will determine the degree to which the adverse cost impacts can be minimized.

6-5. SUMMARY. The approach taken in analyzing the rotation concept was to model the system and evaluate the impacts through the use of regimental stylizations. In completing the CMF evaluations, 16 different regiment stylizations were modeled and evaluated using the simulation and data extraction programs. The purpose of this chapter has been to illustrate the kinds of data generated and evaluation performed for each of the stylizations, using the MX regiment as the example subject. The stylization characteristics, regimental system analysis, and major regimental impacts identified in this example are typical of those associated with each of the regimental stylizations. Insofar as regimental impacts are concerned, those noted in paragraph 6-4 are representative and typical. Much of what has been noted in this evaluation of the stylized MX regiment can be applied to the evaluation of the rotation concept as a whole. Chapter 7 provides an examination of the impacts of the rotation concept on a larger and more general scale through the analysis of CMFs 11, 19, and 13.

CHAPTER 7

CAREER MANAGEMENT FIELD ANALYSIS

7-1. INTRODUCTION. This study analyzed three distinct career management fields (CMF). The purpose of this chapter is to present a review of the impacts of the unit rotation concept on each of the CMF. The impacts as they apply to the most common regiment type for the CMF are examined first, and then the overall impact on the composite CMF is addressed. The three CMFs (11, 19, and 13) will be examined in turn, and the following aspects will be addressed:

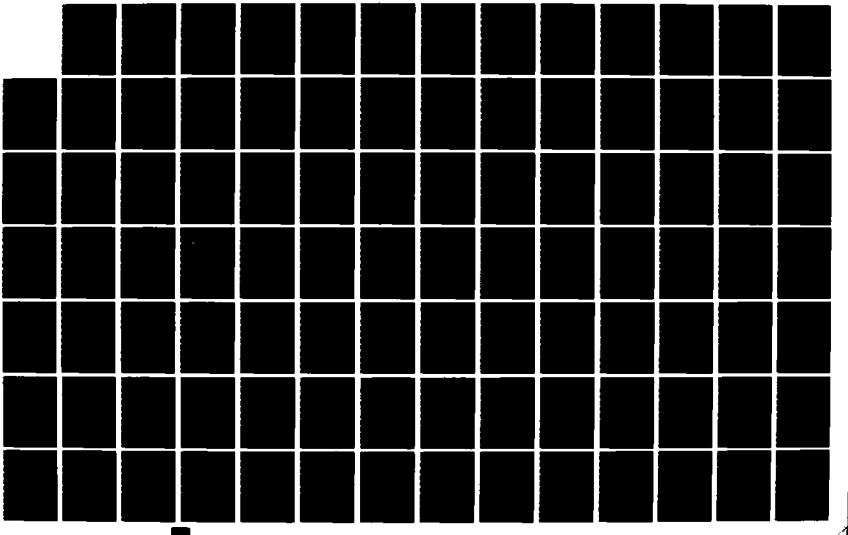
- CMF composition.
- First-term group (FTG) block fill impact on manning level.
- Grade structure/distribution analysis.
- Stability/turnover rate analysis.
- Individual careerist statistics.
- Cost analysis (at end of chapter).

The principal insights in these areas will be noted directly in the discussion of CMF 11. The discussions for CMF 19 and 13 will address deviations from the predominant patterns of CMF 11.

7-2. CAREER MANAGEMENT FIELD 11 (INFANTRY)

a. CMF 11 Composition. CMF 11 is comprised of soldiers with MOS 11B, 11C, and 11H. They are assigned primarily to infantry battalions and in the mortar platoons of armor battalions. Tables 7-1 and, later, 7-6 show the distribution of these battalions among the type regiments that were assumed for the study by location and movement action. Nonrotational (NR) units are those that could not be grouped or were assigned unique missions. All other CMF 11 positions were included in the ERA populations. Table 5-3 (see Chapter 5) shows the composition of the infantry regiments formed from this force structure. A number of battalions were not rotated. The two Korea MX battalions were modeled using unit replacement (repl) by provisional CONUS battalions. (This process was described in Chapter 4.) Two MX and two airborne battalions did not rotate due to their expected missions (school support, national training center, or Ranger battalions). One air assault (AA) and six motorized (Mtz) battalions could not be grouped with OCONUS units for rotation. All 10 airborne battalions were grouped into a single regiment due to their single homebase location.

AD-A131 292 UNIT REPLACEMENT SYSTEM ANALYSIS I (URSA I)(U) ARMY 2/3
CONCEPTS ANALYSIS AGENCY BETHESDA MD
D R HOLDSWORTH ET AL. JAN 82 CAA-SR-82-1
UNCLASSIFIED F/G 5/9 NL



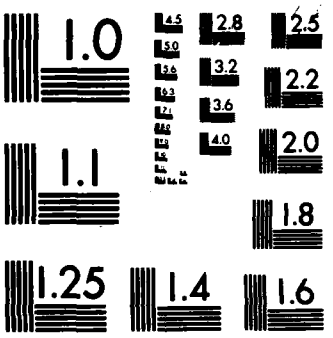


Table 7-1. Infantry Battalion Distribution by Theater and Movement Action[a]

Regiment	CONUS			Europe		Korea			Panama		Hawaii		Alaska		Total		
	R	NR	Repl	R	NR	R	NR	Repl	R	NR	R	NR	R	NR	R	NR	Repl
MX	23	2	2[b]	22				2	1						46	2	4
Mtz	9	6				3					6				18	6	
AA	8	1		3					2				3		16	1	
Abn		11			1											12	
Total	40	20	2[b]	25	1	3		2	3		6		3		80	21	4

b. FTG Block Fill Impact

(1) Of the CMF 11 regiments, the MX regiment is the most common: therefore, the direct regimental examination for this CMF will use that stylization as the basis. For this CMF, then, the direct regimental discussion will be a reduced version of the discussion in Chapter 6, which addressed the MX regiment.

(2) For the MX regiment, the impact on total manning level of the FTG block fill is graphically illustrated in Figure 7-1. The total strength of the stylized regiment surges in a cyclic fashion, with the fluctuation in manning level being on the order of twenty percent of the total authorized strength. Further, the average manning level of the regiment during the period of observation is approximately 110.8 percent of the authorized strength.

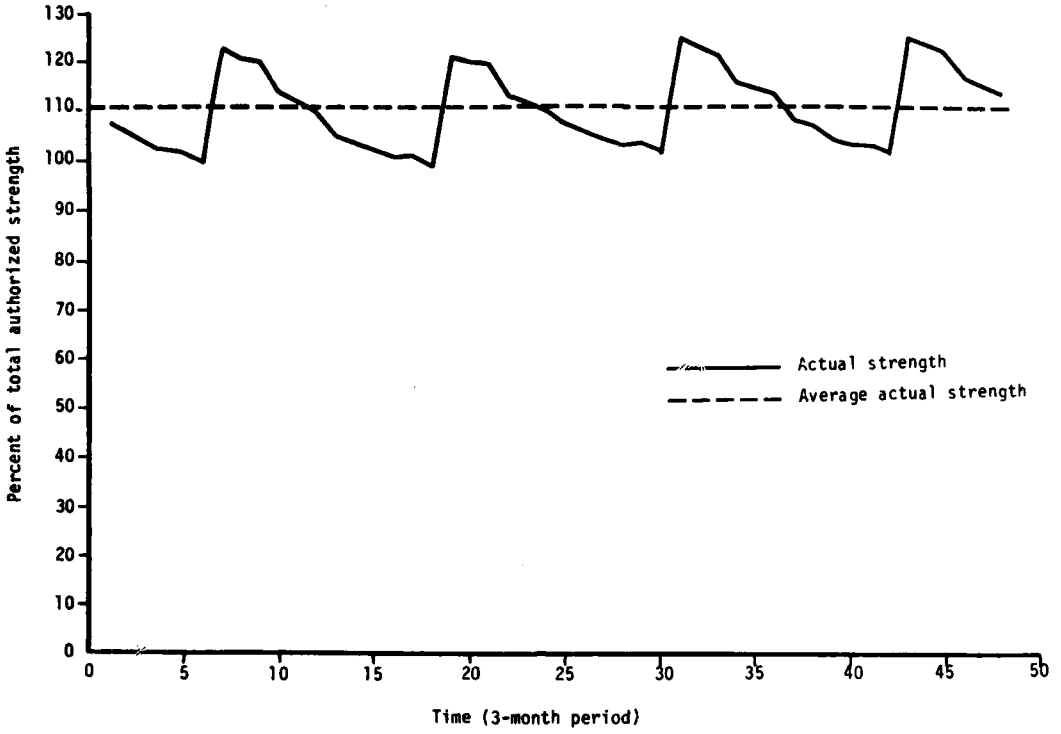


Figure 7-1. Total Strength Level Variation for MX Regiment

(3) As noted in Chapter 6, the level of overfill observed in the simulations is due not only to the natural consequences of block fill, but is also due to the procedure used for calculating FTG requirements and the particular manning level decision criteria. It is quite likely that more refined policies would reduce the magnitude of the overfill, but not to the level achievable with individual replacement.

(4) On an entire CMF basis, it is possible that the surges would be smoothed if different regimental groupings could be put in phase with each other (with respect to their assignment windows). The total CMF manning level, however, should still be directly related to the regimental average manning levels. Table 7-2 summarizes the manning levels generated for each regiment type and also gives the CMF total. As was the case for the MX regiment, the overall CMF total indicates a high manning level. This result cannot totally be avoided and cannot be minimized without either some revision to the procedure for determining personnel inputs (i.e., FTG fill), or adjustment of promotion/attrition rates and MOS transitions.

Table 7-2. Modeled vs Authorized Strength - CMF 11

Regiment type	Number of regiments	Authorized strength	Modeled strength	Fill level (percent)
Mechanized	23	1,653	1,832	110.8
Motorized	3	1,759	1,851	105.2
Air Assault	8	1,516	1,507	99.4
Airborne	1	2,789	2,766	99.2
CMF Composite		58,213	64,038	110.0

c. Grade Structure/Distribution

(1) Chapter 6 made note of the fact that the combination of inherent grade distribution mismatches (between expected and authorized distributions) and system total overfills, could result in personnel management problems. These conditions are illustrated for the MX regiment and CMF 11 in Figures 7-2 through 7-5. Figures 7-2 and 7-3 illustrate a tendency towards personnel strength overfills at the lower grades and shortages at the higher grades. So long as the overall manning level is between the minimum (ALO 3) and maximum (ALO 1) required levels, then effective use could be made of grade substitution to minimize adverse impacts.

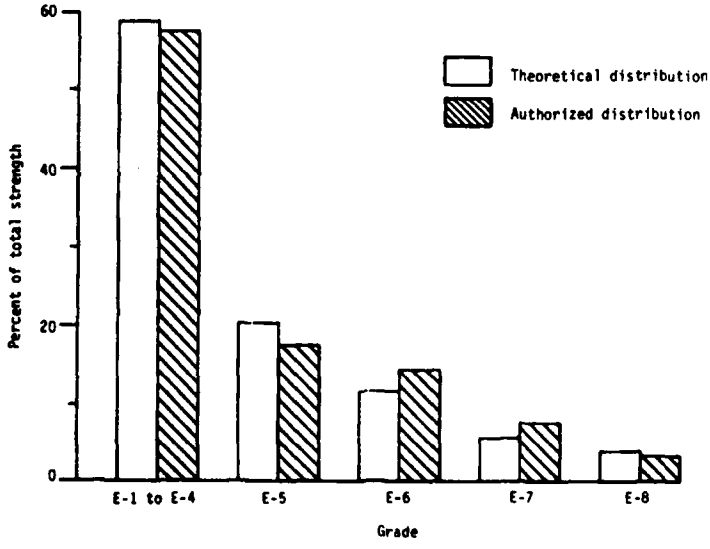


Figure 7-2. Theoretical vs Authorized Grade Distribution - MX Regiment

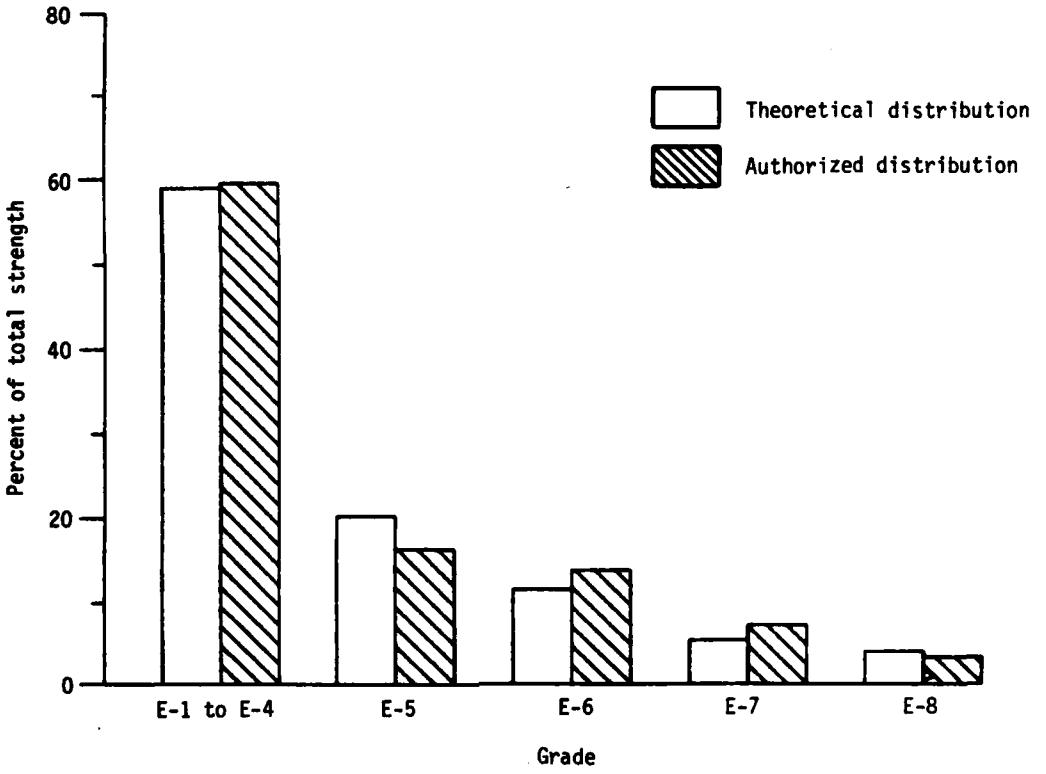


Figure 7-3. Theoretical vs Authorized Grade Distribution - CMF 11

(2) As noted in subparagraph 7-2b, for CMF 11 the average manning level is greater than the authorizations. Given this CMF manning level, Figures 7-4 and 7-5 show that the problem would be concentrated at E-1 to E-4 and E-5 grades. Reducing this overall manning level would produce a structure that would be acceptable on the basis of filling authorized slots, but would also result in a "young" CMF (i.e., one with substantial grade substitution at E-6 and E-7).

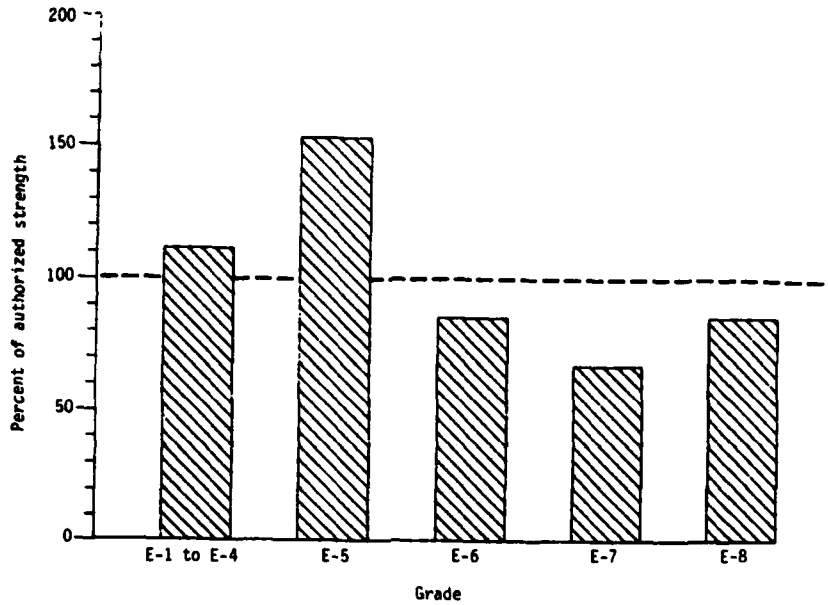


Figure 7-4. Actual vs Authorized Strength for CMF 11 Without Grade Substitution

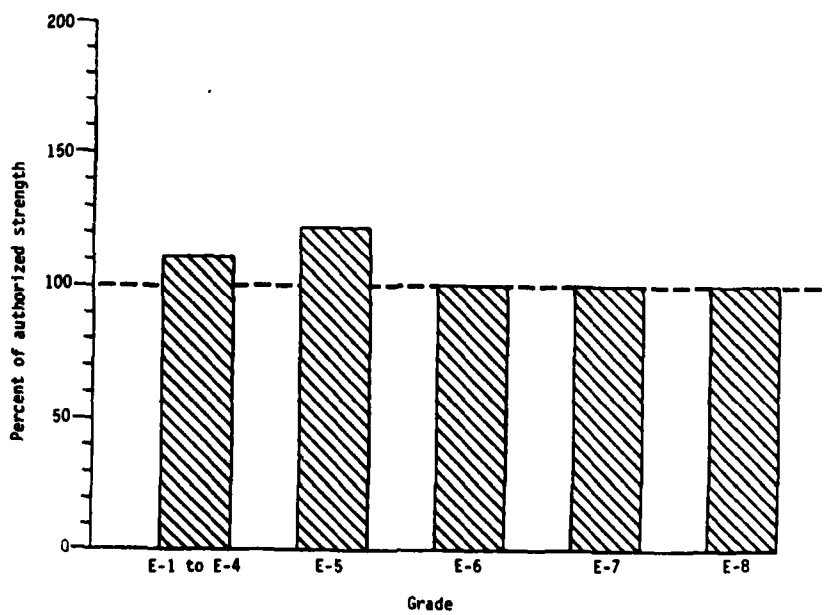


Figure 7-5. Actual vs Authorized Strength for CMF 11 With Grade Substitution

(3) This last problem, however, is not necessarily the result of the application of a unit rotation scheme. The mismatch between the distribution expected as a result of normal progression and that reflected in the CMF authorization is, to a large degree, independent of the way FTG fill is introduced to the system. On an overall CMF basis, the surges associated with the block fill in individual units would be minimal, and the main issues would be level of fill and degree of grade substitution necessary.

d. Stability and Turnover Rates

(1) The behavior of the MX battalions is representative of that exhibited by the rotating battalions in each of the other 16 stylizations. Figures 7-6 and 7-7 illustrate that the rotation concept has been successful in ensuring that a high proportion of the unit personnel strength is composed of individuals who would have been assigned to that unit for at least 18 months. In addition, Figure 7-8 shows that, to a large extent, the movement of personnel into and out of the unit has been limited to planned periods.

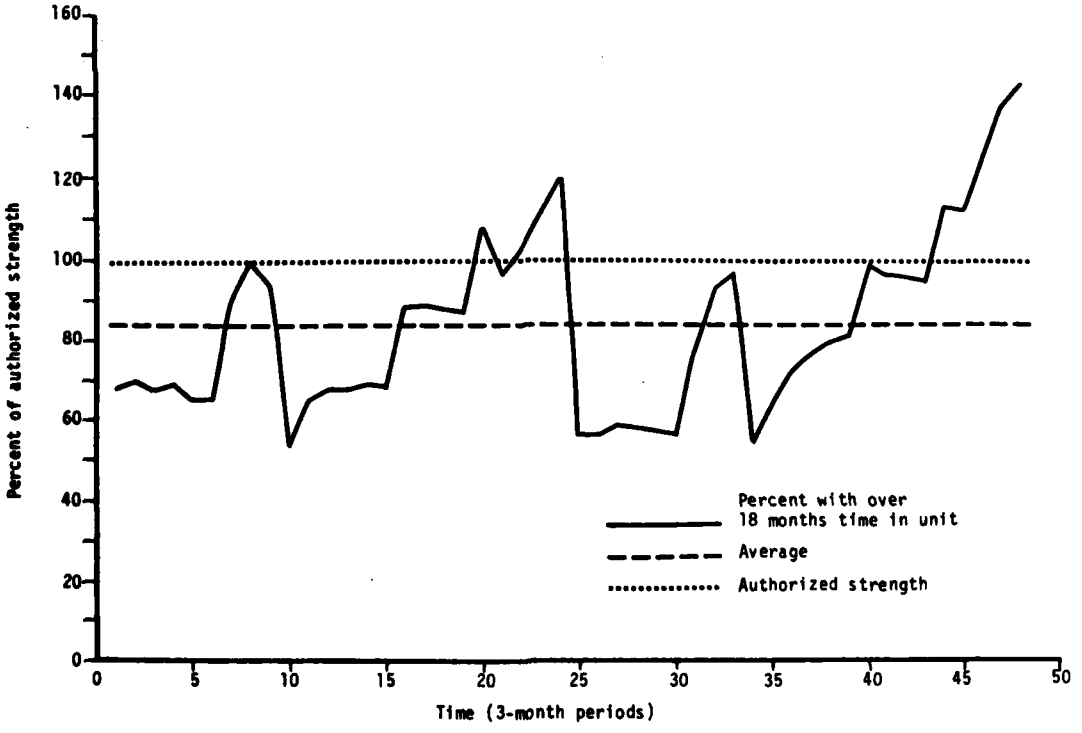


Figure 7-6. Percent of MX Battalion E-5 to E-8 Strength With 18 or More Months of Time in Units

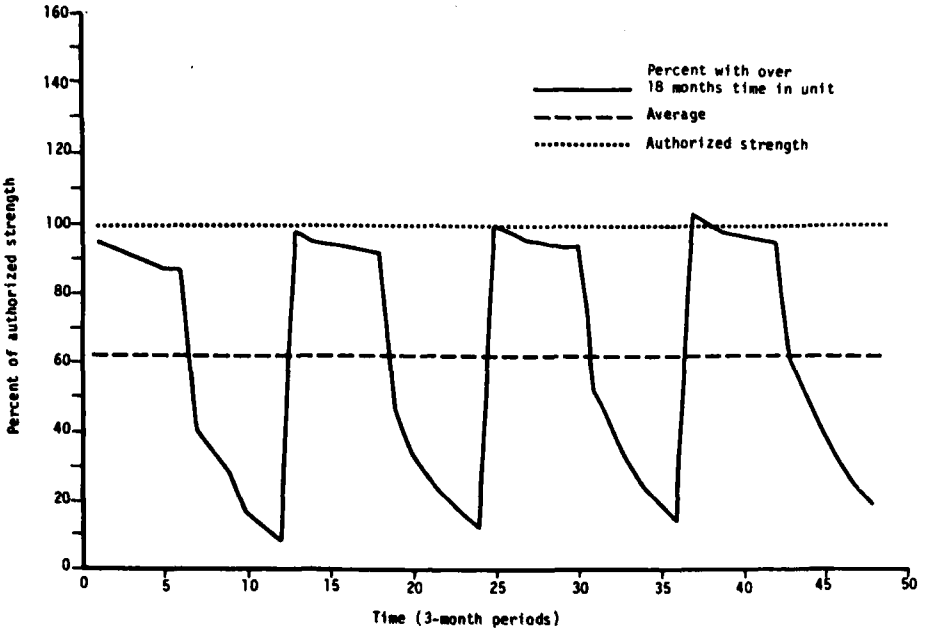


Figure 7-7. Percent of MX Battalion E-1 to E-4 Strength With 18 or More Months of Time in Unit

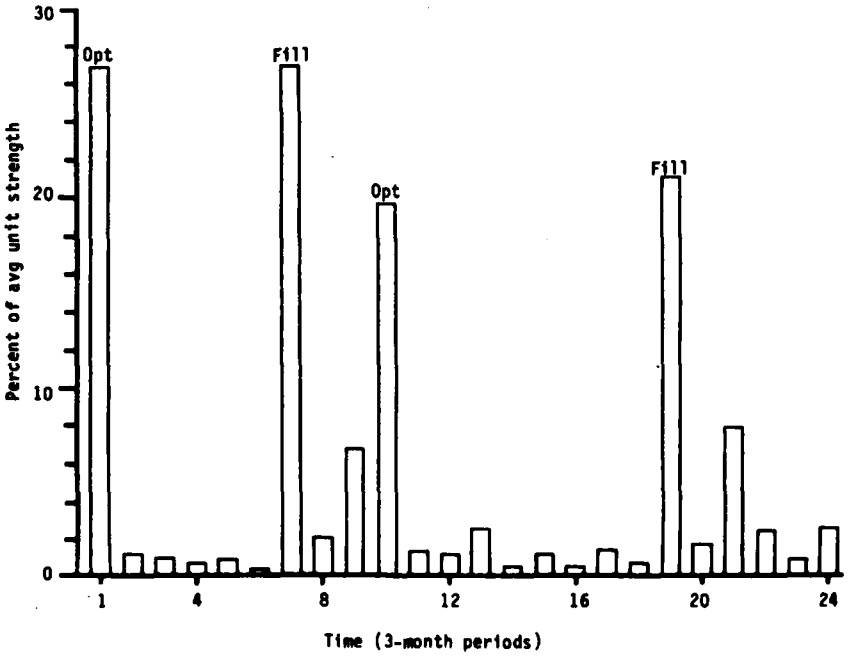


Figure 7-8. Percent Turnover Per Quarter in MX Battalion

(2) That the rotation concept is successful in increasing the level of assigned experienced personnel and reducing the turnover rate in the stabilized period is evident from the preceding graphs. What is not evident is that this desirable goal is achieved at the sacrifice of those same qualities in the CONUS ERA pools. While the annual turnover in the battalion is down to 24 percent, the CONUS ERA pools which represent approximately 15 percent of the regimental population, endure a turnover rate of 50 percent. It follows that, for a given regimental system, reducing the turnover rate in one portion of the population will generate a corresponding increase in the other portion. To preclude that occurrence, the only recourse would be to adjust some other aspect of the system behavior (e.g., changing the acceptable ratio of CONUS to OCONUS time).

(3) The performance of the total CMF is summarized in Table 7-3. The airborne regiment stylization did not provide for rotation of battalions, but in the other cases rotation was modeled, and the results are consistent with those observed for the MX regiment. The first pair of figures demonstrates that the turnover rate during a stabilized quarter is less than one-tenth of that during an unstabilized quarter. The second pair of figures compares the total turnover on a yearly basis, and again even though turnover during the stabilized portion of the year is much larger than during the stabilized quarter, the total turnover during the year is still less than that of the unstabilized quarter. Finally, the third set of figures in Table 7-3 provides an indication of the personnel movement burden that has been transferred to the CONUS ERA pools.

e. Individual Careerist Statistics

(1) Six of the more general type of statistics gathered for the CMF are tabulated in Table 7-4. This information is useful in determining the extent to which the personnel movements imposed by the rotation concept on the CMF form an acceptable pattern.

(2) The first column shows that on the average, the assignments to a rotational unit are long. The second column reveals a trend that is consistent with the biases in grade authorization; that is, more low grade slots in the rotational units, and more higher grade slots in the ERAs. The third column provides an indication of the overall success, or lack thereof, in effectively implementing homebasing. The fourth and fifth reveal the trends in the CONUS and OCONUS time, which reflect the consequences of the geographic distribution of the personnel authorizations. Finally, the last column provides an indication of both the likelihood of an individual receiving a short tour assignment and the degree to which the CMF is impacted by the short tour burden.

Table 7-3. CMF 11 Stabilized vs Unstabilized Unit Turnover

Regiment	Average unit turnover[a]					Yearly CONUS ERA
	Quarterly		Yearly[b]			
	Stabilized	Unstabilized	Stabilized	Unstabilized	Total	
MX	2.1	25.5	6.8	17.1	23.9	50.0
Mtz	2.2	23.3	7.2	15.5	22.7	42.4
AA	2.0	24.2	6.6	16.1	22.7	40.8
Abn					25.6	32.8
CMF average	2.1	25.0	6.8	16.7	24.0	45.6

[a]In percent of average strength.

[b]Assumes 3 1/3 stabilized periods and 2/3 unstabilized periods per year average.

Table 7-4. CMF 11 Careerist Statistics

Grade	Rotational unit tour length (years)	Time spent in units (percent)	Time spent at homebase (percent)	Time spent in CONUS (years)	Time spent OCONUS (years)	Number of short tours
E-1 to E-4	3.1	87.5	48.5	2.1	1.8	0.1
E-5	4.6	77.3	50.9	4.5	3.1	0.2
E-6	5.3	69.4	47.3	7.6	4.6	0.4
E-7	5.0	62.1	43.7	10.2	5.7	0.5
E-8	5.0	54.5	40.5	14.1	7.4	0.9

(3) While the preceding data have been aggregated by grade, two additional parameters have been extracted on a career basis and are illustrated graphically to provide an example of the variability observed. Figure 7-9 depicts the distribution of careerists by the number of years spent at the homebase during their simulated career. While the majority of the careerists spend from 6 to 12 years at the homebase, the degree of variation (technically the standard deviation) is considerable. The fact that there is a small rise in careerists with 18 years at the homebase is attributable to the presence of the airborne regiments in the CMF total. Recall that the airborne regiments had no rotating battalions, and only one OCONUS battalion, and in this particular case the tendency is for extended assignments to the homebase.

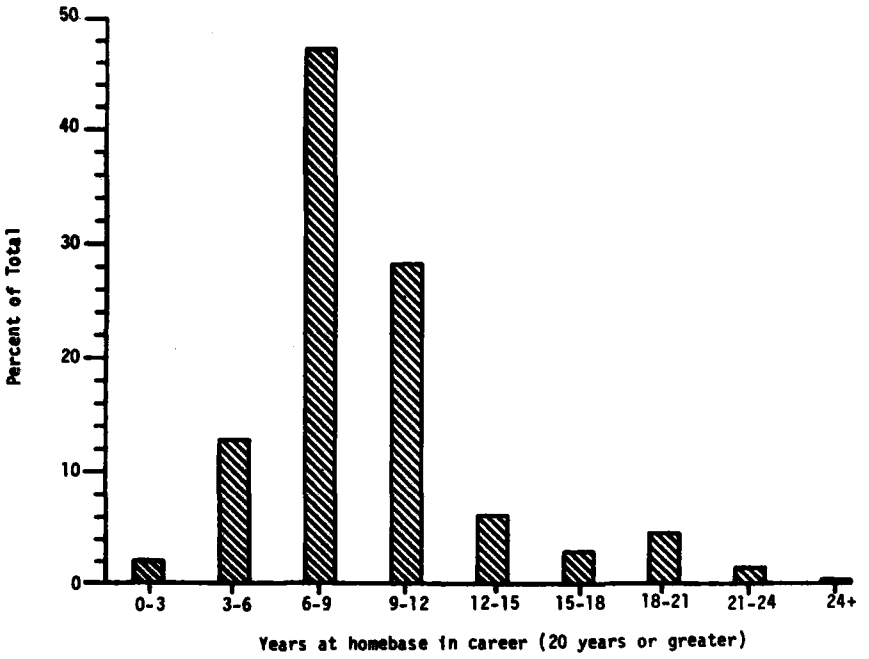


Figure 7-9. Distribution of Careerists by the Time Spent at Homebase for CMF 11

(4) Figure 7-10 depicts the distribution of careerists by the number of PCS in a career. Once again, though the most likely number of PCS is eight, there is a minor group in the interval from zero to two PCS attributable to the stationary airborne battalions. Other than that, the distribution appears typical of the type that would be exhibited by a large sampling population.

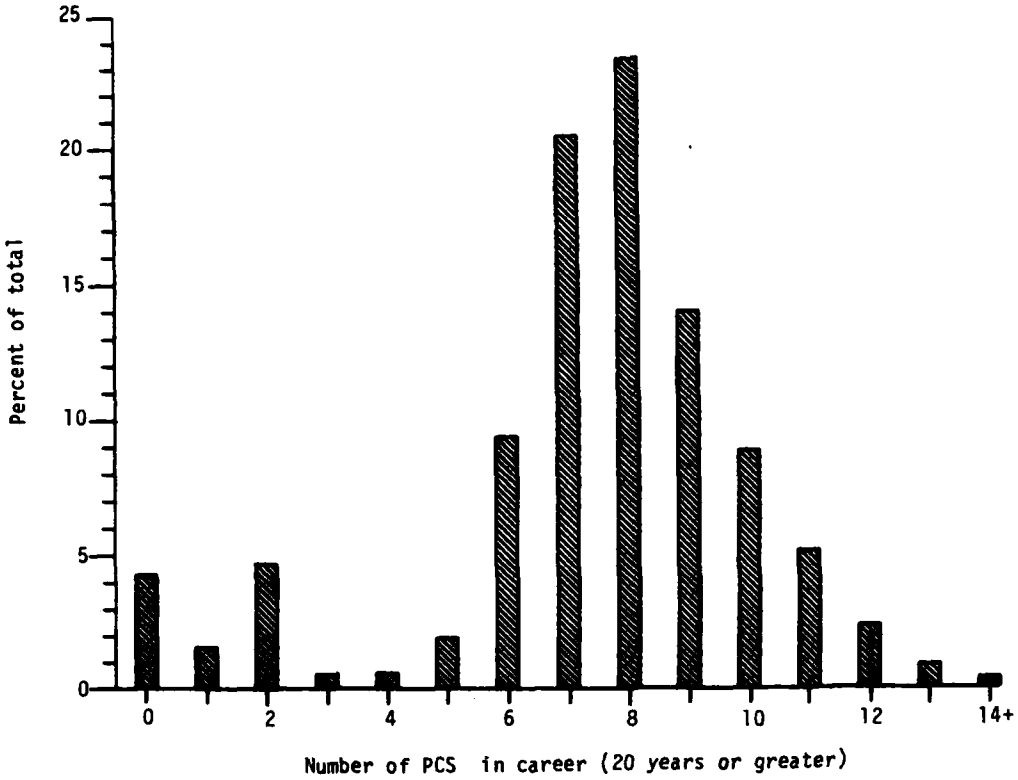


Figure 7-10. Distribution of Careerists by the Number of PCS for CMF 11

7-3. CAREER MANAGEMENT FIELD 19 (ARMOR)

a. CMF 19 Composition. Table 7-5 identifies the armor battalions addressed in this study. The armor MOS found in these units and included in the CMF 19 analysis are: MOS 19D, 19E, 19K, and 19Z. Table 5-4 (see Chapter 5) shows the composition of the armor regiments formed from the force structure. Two tank battalions did not rotate due to their expected missions (school support and national training center). The two tank battalions in Korea that are equipped with M48 tanks were modeled using unit replacement by provisional CONUS battalions. The squadrons in one European armored cavalry regiment (ACR) were replaced by provisional squadrons. The remaining cavalry units were not rotated due to the diversity of assigned MOS.

Table 7-5. Armor Battalion Distribution by Theater and Movement Action

Regiment	CONUS			Europe			Korea			Total		
	R	NR	Repl	R	NR	Repl	R	NR	Repl	R	NR	Repl
Tank	24	2	2[b]	24					2	48	2	4
Hvy cavalry		5			5						10	
Lt cavalry		6						1			7	
Super ACR	3		3[b]	3		3				6		6
	27	13	5	27	5	3		1	2	54	19	10

[a]R = rotational; NR = nonrotational, Repl = replacement.

[b]Provisional battalions.

b. FTG Block Fill Impact

(1) Figure 7-11 shows that for the stylized tank regiment, the cyclic pattern of surges in total strength are similar to those of the MX regiment. The average fill level observed in this case (approximately 89 percent) is below the maximum authorized. This differs from the condition observed in the MX regiment and CMF 11. The reason for the lower manning level observed here is that, as discussed in Chapter 4, the criteria used to determine FTG fill is not compatible with the system. FTG requirements were determined principally by comparing E-1 to E-4 strength on hand to the minimum (ALO 3) requirement rather than considering total system personnel losses. Consequently, there is no assurance that the personnel inputs will correspond with the requirements dictated by the grade structure and the existing attrition rates. In the CMF 19 simulations the reduced ALO 3 strength requirement (as compared to the MX regiment) enabled the system to absorb the increase in manning level generated by the block fill without exceeding the maximum authorized strength. The intricacies and implications of the FTG fill determination criteria are discussed in Chapter 4.

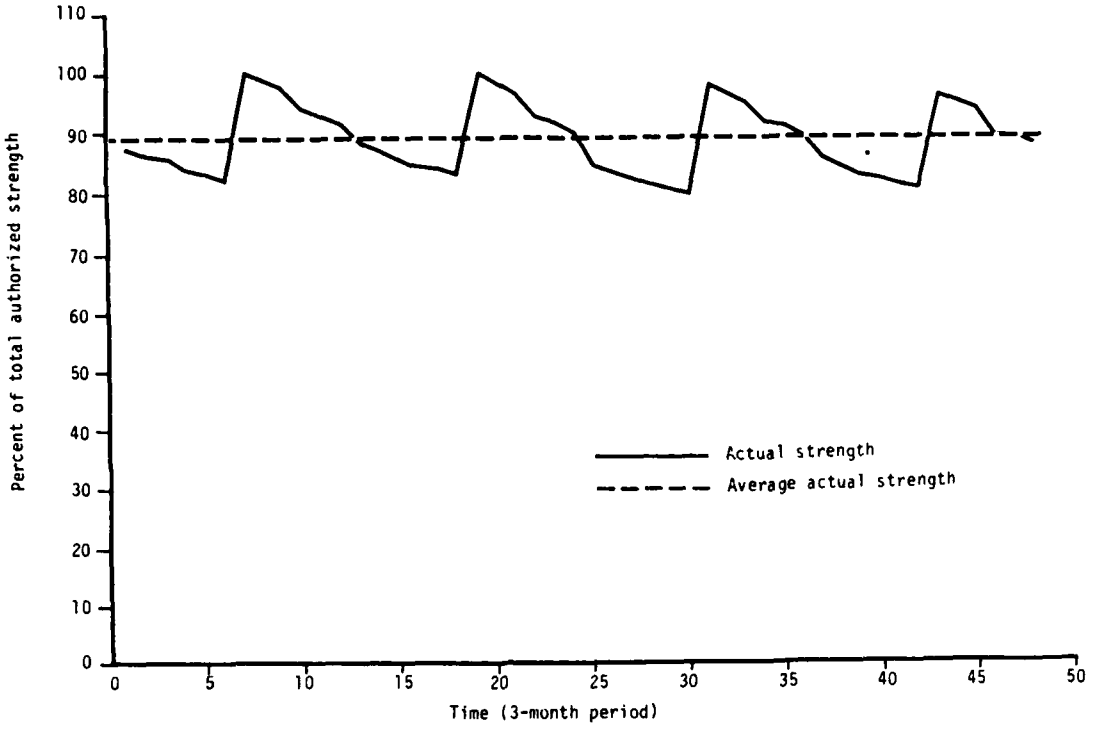


Figure 7-11. Total Strength Level Variation for the Tank Regiment

(2) Because the proportional number of tank regiments in CMF 19 is high, the overall CMF 19 manning level impact closely parallels that of the tank regiment. Table 7-6 summarizes the manning levels associated with CMF 19 and its regiment types. Although the other regiment types have manning levels higher than that of of the tank regiment, the preponderance of tank regiments is sufficient to result in overall manning, on a CMF wide basis, below the maximum strength authorization.

Table 7-6. Modeled vs Authorized Strengths - CMF 19

Regiment type	Number of regiments	Authorized strength	Modeled strength	Fill level (percent)
Tank	24	787	701	89.1
Heavy Cav	5	1,434	1,399	97.6
Armored Cav	1	1,122	1,191	106.1
Light Cav	1	586	710	121.2
CMF Composite		27,766	25,720	92.6

(3) Any refinements made to the procedure for determining FTG fill requirements for CMF 11 will probably help to minimize the overfills experienced by the regiments in CMF 19.

c. Grade Structure/Distribution

(1) The comparison of expected and authorized grade distributions for the tank regiment is shown in Figure 7-12. As before, the predominance of the tank regiment type causes the overall CMF 19 comparison shown in Figure 7-13 to reflect essentially the same characteristics. For CMF 19, it appears that vacancies could be expected at the higher grades. The fact that there would be a shortage of E-5 personnel, combined with the lower overall manning level results in a far less critical situation for CMF 19 than was observed for CMF 11. Figures 7-14 and 7-15 show that the grade structure obtained from the simulation is reasonably uniform before grade substitution, that after grade substitution no excesses occur, and that the shortage is confined to the E-1 to E-4 personnel.

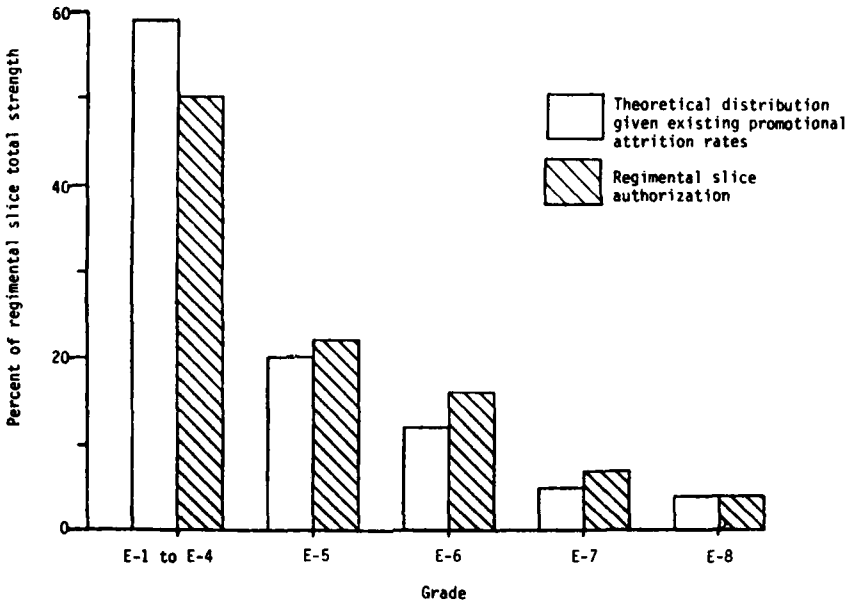


Figure 7-12. Theoretical vs Authorized Grade Distribution - Tank Regiment

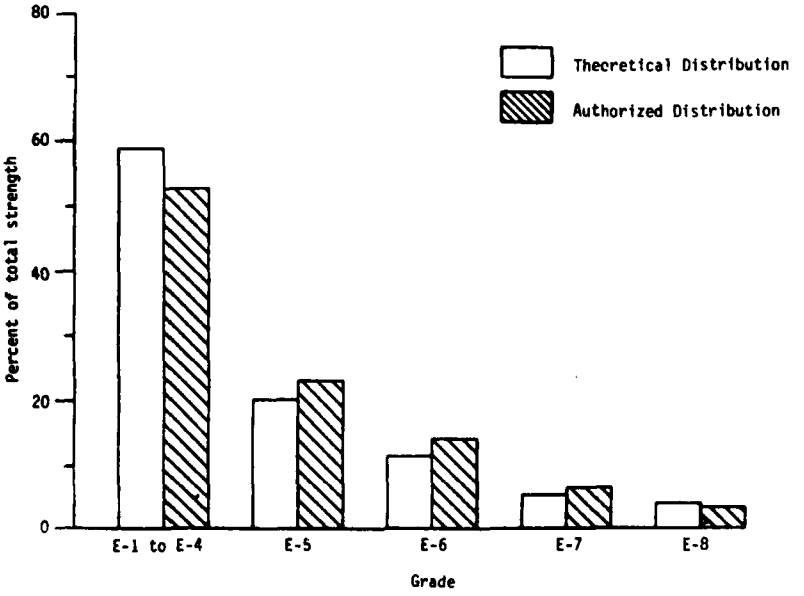


Figure 7-13. Theoretical vs Authorized Grade Distribution - CMF 19

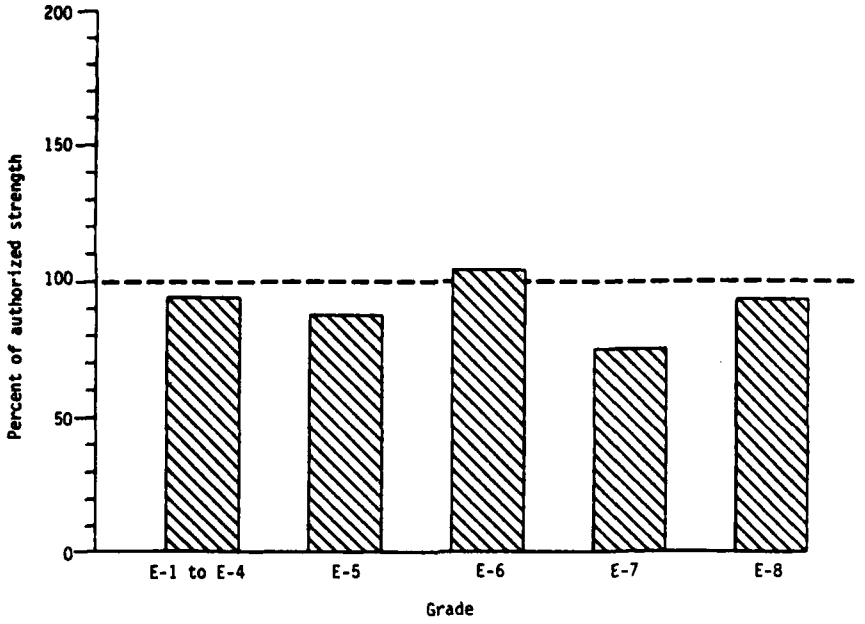


Figure 7-14. Authorized vs Actual Strength for CMF 19 Without Grade Substitution

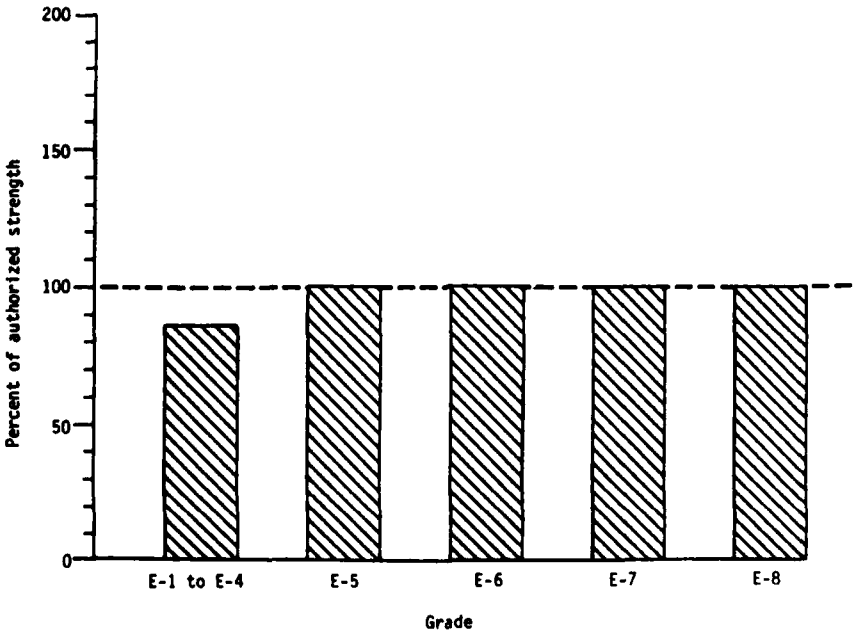


Figure 7-15. Authorized vs Actual Strength for CMF 19 With Grade Substitution

(2) As a result of the reduced manning level observed in the tank regiment, CMF 19 totals do not present the type of problems noted in the discussion of the CMF 11 grade structure/distribution. Where problems might arise is in the case of particular regiments (e.g., light cavalry regiment where the modeled manning level exceeds the authorized), and since these regiments are few in number they could be addressed on an individual basis.

d. Stability and Turnover Rates. The comments made regarding CMF 11 apply to CMF 19 also. The graphs in Figures 7-16 and 7-17 for the tank regiment, as in the case of the MX regiment in CMF 11, display significant levels of experienced personnel. Figure 7-18 shows that the turnover in the tank battalions is successfully confined to the desired periods. The turnover data provided in Table 7-7 confirms the overall success in minimizing CMF 19 turnover in the battalions but not in the CONUS ERA pools.

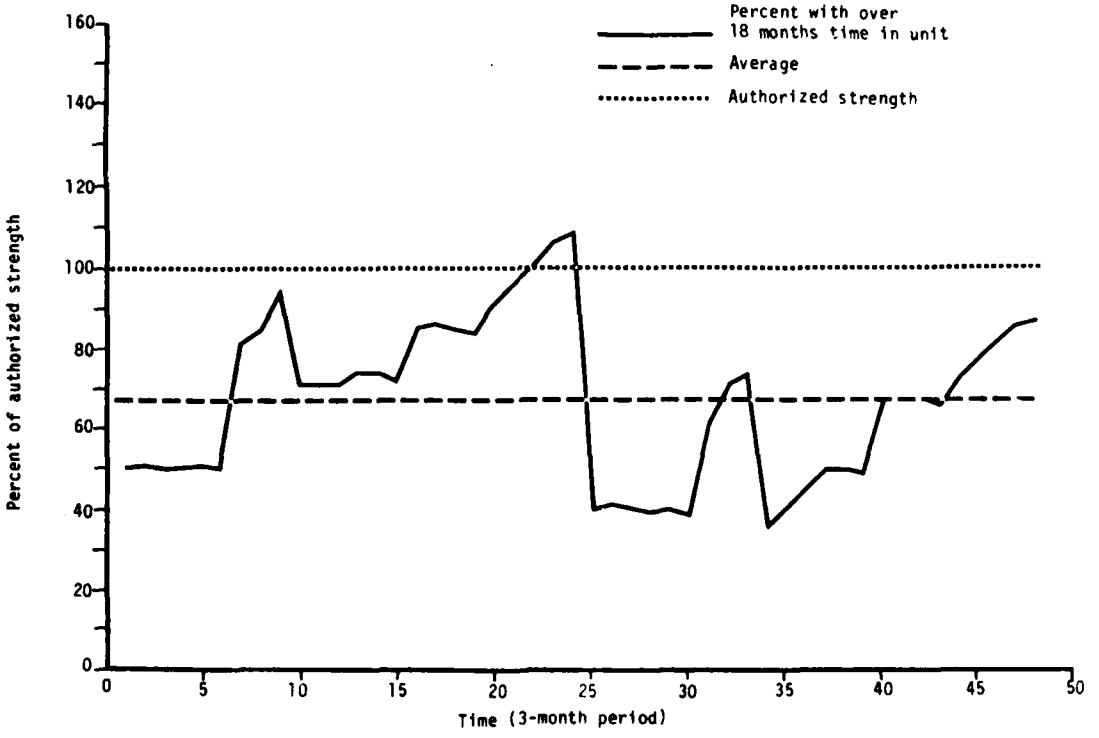


Figure 7-16. Percent of Tank Battalion E-5 To E-8 Strength With 18 or More Months of Time in Unit

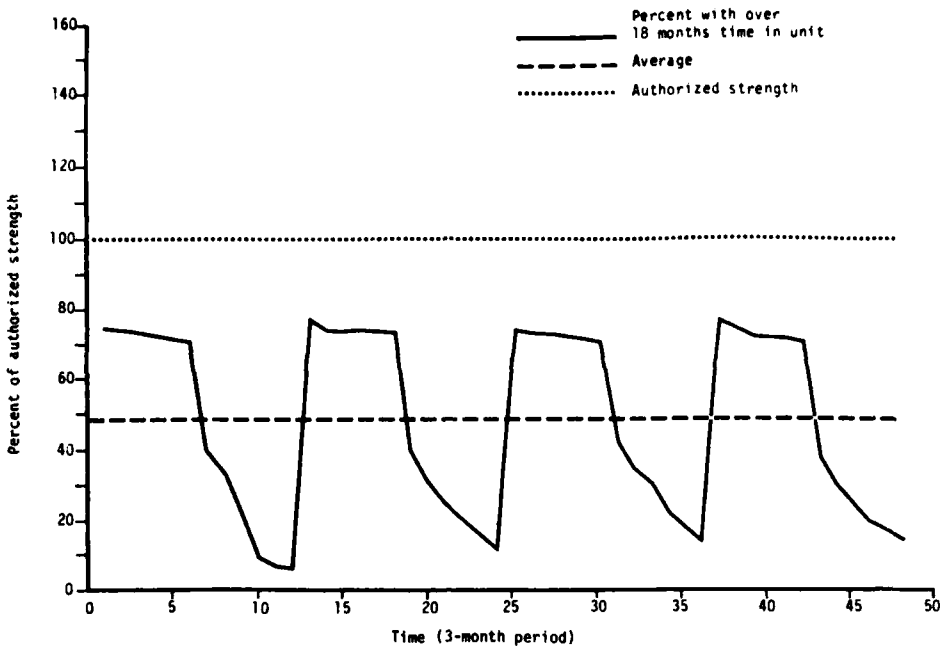


Figure 7-17. Percent of Tank Battalion E-1 to E-4 Strength With 18 or More Months of Time in Unit

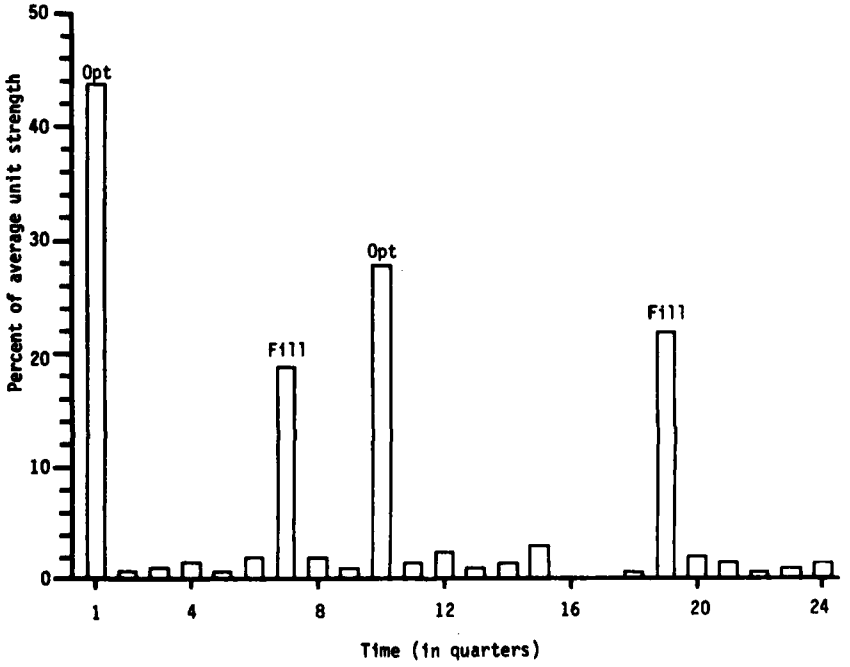


Figure 7-18. Percent Turnover per Quarter in Tank Battalion

Table 7-7. CMF 19 Stabilized vs Unstabilized Unit Turnover

Regiment	Average unit turnover[a]					Yearly CONUS ERA
	Quarterly		Yearly[b]		Total	
	Stabilized	Unstabilized	Stabilized	Unstabilized		
Tank	2.2	27.1	4.0	18.1	22.1	48.8
Heavy cav	1.8	26.4	6.1	17.6	23.7	48.0
Armored cav	2.6	25.8	8.7	17.2	25.9	44.0
Light cav	N/A	N/A	N/A	N/A	25.9	50.0
CMF average	2.2	26.9	4.5	18.0	22.4	48.7

[a]In percent of average strength.

[b]Assumes 3 1/3 stabilized periods and 2/3 unstabilized periods per year average.

e. Individual Careerist Statistics. The data provided in Table 7-8 indicate that on the average the differences in CMF 19 careerist statistics from those of CMF 11 are minimal. The differences that are present are largely due to the previously noted inconsistency in the CMF 11 data caused by the lack of rotating units in the airborne regiment. The distributions in Figures 7-19 and 7-20, while being on the same order as those of CMF 11, indicate a more typical degree of variation in the values observed for this CMF.

Table 7-8. CMF 19 Careerist Statistics

Grade	Rotational unit tour length (years)	Time spent in units (percent)	Time spent at homebase (percent)	Time spent in CONUS (years)	Time spent OCONUS (years)	Number of short tours
E-1 to E-4	2.8	83.1	39.5	2.2	1.8	0.1
E-5	4.1	81.7	39.4	4.4	3.3	0.2
E-6	4.0	74.9	32.6	7.2	5.0	0.4
E-7	4.4	74.5	33.9	9.6	6.7	0.5
E-8	4.4	71.3	36.9	12.5	8.6	0.4

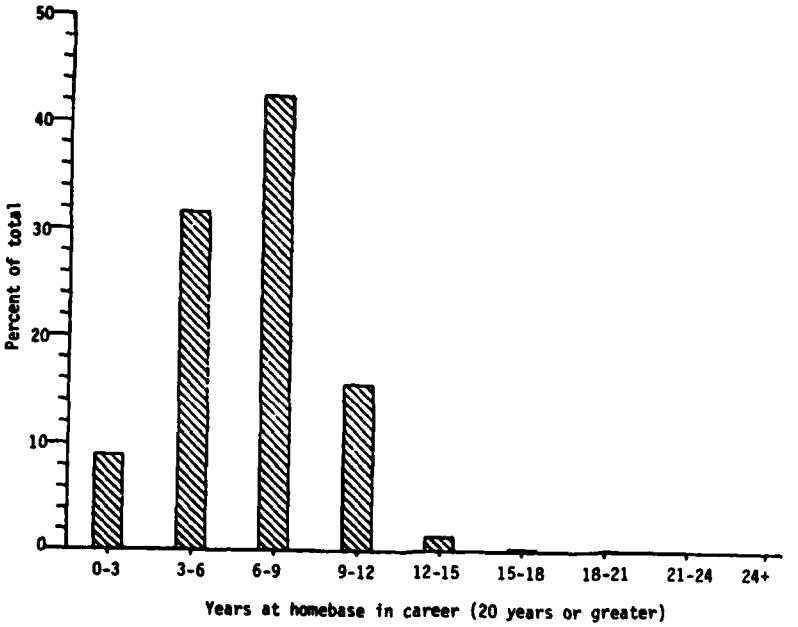


Figure 7-19. Distribution of Careerists by the Time Spent at Homebase for CMF 19

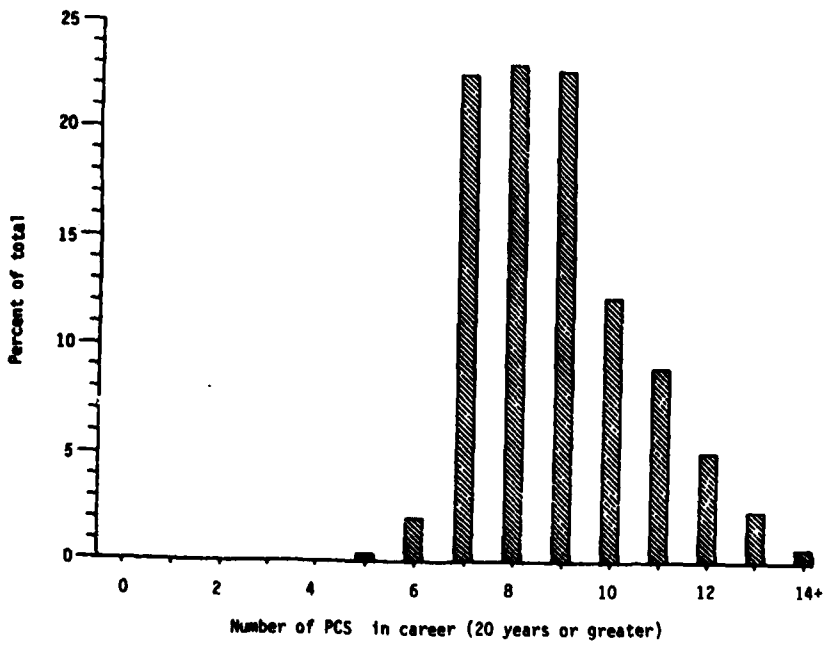


Figure 7-20. Distribution of Careerists by the Number of PCS for CMF 19

7-4. CAREER MANAGEMENT FIELD 13 (ARTILLERY)

a. CMF 13 Composition. This study considered the occupational specialties related to cannon artillery, i.e., MOS 13B, 13C, 13E, 13F, 13W, and 13Y. Other MOS of CMF 13 were considered only if found in units being studied, i.e., MOS 15D/15J (8-in MLRS bn) and 82C. The MOS that were not studied, 13R, 13Z, 15E, and 93F, were either low-density or missile specialties. Table 7-9 displays the cannon artillery battalions by type regiment and locations that were assumed for the study. Table 5-5 in Chapter 5 shows the composition of cannon artillery regiments formed from this force structure. All 14 of the battalions designated as nonrotating were so designated because they could not be grouped with homebased or like-type organizations.

Table 7-9. Cannon Artillery Battalion Distribution by Theater and Movement Action

Regiment	CONUS			Europe		Korea			Hawaii		Alaska		Total		
	R	NR	Repl	R	NR	R	NR	Repl	R	NR	R	NR	R	NR	Repl
105T	3	3									1		4	3	
155T	8	1				2			2				12	1	
155SP	19	2	1[b]	19				1					38	2	2
8-in SP	3			3	8							6	8		
8-in MLRS	5		1[b]	4				1	1				10		2
	38	6	2[b]	26	8	2		2	3		1		70	14	4

[a]R = rotational, NR = nonrotational, Repl = replacement.

[b]Provisional battalions.

b. FTG Block Fill Impact Figure 7-21 reveals the usual cyclic pattern of fluctuations in modeled strength, this time for the 155SP regiment. Compared to the MX regiment, an even higher average manning level is sustained and the amount of variation is increased. For CMF 13 as a whole, however, the average manning level is almost exactly the same as that observed for CMF 11. The CMF 13 manning level data are shown in Table 7-10. The comments regarding the problems, causes, and potential remedies and impacts that were made for CMF 11 also apply to CMF 13.

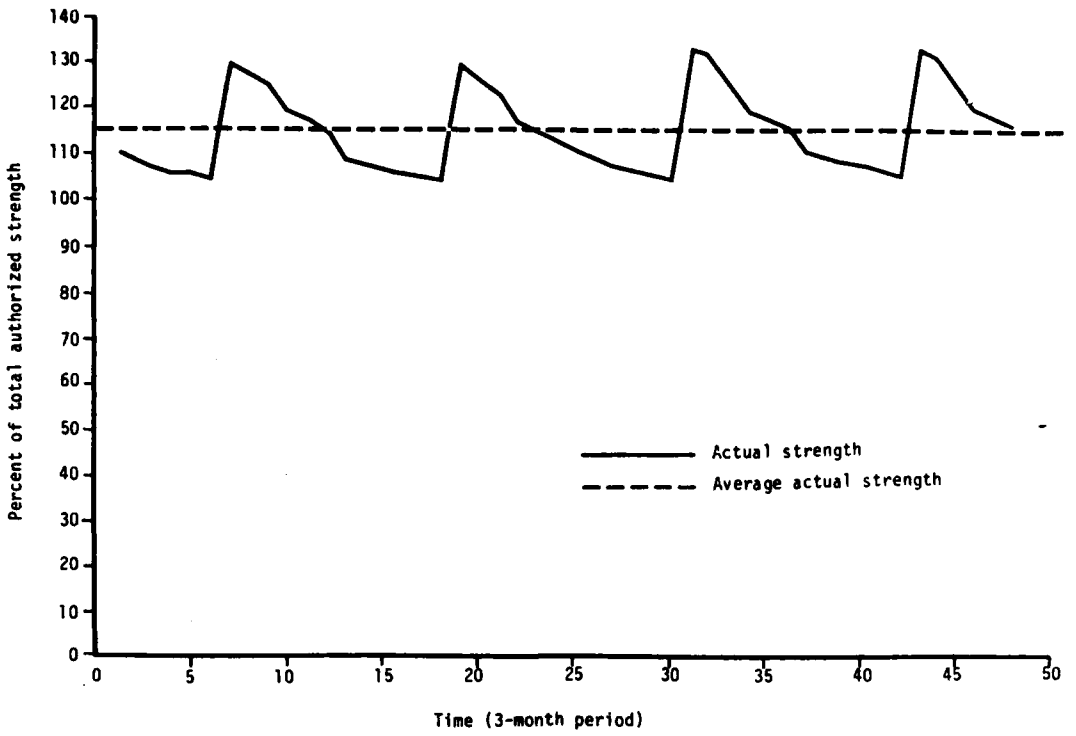


Figure 7-21. Total Strength Level Variation for 155SP Regiment

Table 7-10. Modeled vs Authorized Strength - CMF 13

Regiment type	Number of regiments	Authorized strength	Modeled strength	Fill level (percent)
155SP	19	1,375	1,574	114.5
8-in MLRS (Europe)	4	1,785	2,129	119.3
8-in/MLRS (Hawaii)	1	1,785	2,132	119.4
155T (Hawaii)	2	1,672	1,637	97.9
155T (Korea)	2	2,648	2,677	101.1
105T (Ft Bragg)	1	1,305	1,074	82.3
105T (Ft Campbell)	1	2,089	2,124	101.7
8-in SP	3	734	726	98.9
CMF Composite		49,286	54,558	110.7

c. Grade Structure/Distribution. The problems noted in the CMF 11 discussion caused by the combination of system overfill and excess E-5 strength also apply to CMF 13, and to an even greater degree. Figures 7-22 and 7-23 indicate a large expected overfill of E-5 personnel which the higher grades would not be able to support. When the comparison is made between the observed and the authorized average strengths in CMF 13, as in Figure 7-24, it becomes apparent that the E-5 overfill is a bottleneck handicapping the entire system. As was the case for CMF 11, Figure 7-25 demonstrates that the principal area of concern is at E-5. Minimization of the overfill tendency caused by the simple FTG fill procedure would work to simutaneously alleviate the grade structure bottleneck. For further discussion, reference is made to Section 7-2B and Chapter 6.

d. Stability and Turover Rates. The comments made regarding CMF 11 apply to CMF 13 also. The graphs in Figures 7-26 and 7-27 show that the 155SP regiment displays significant levels of experienced personnel as does the MX regiment in CMF 11. Figure 7-28 shows that the high turnover in the 155SP battalion is generally confined to the desirable periods. The turnover data provided in Table 7-11 confirm the overall success in minimizing CMF 13 turnover in the units, but not in the CONUS ERA pools.

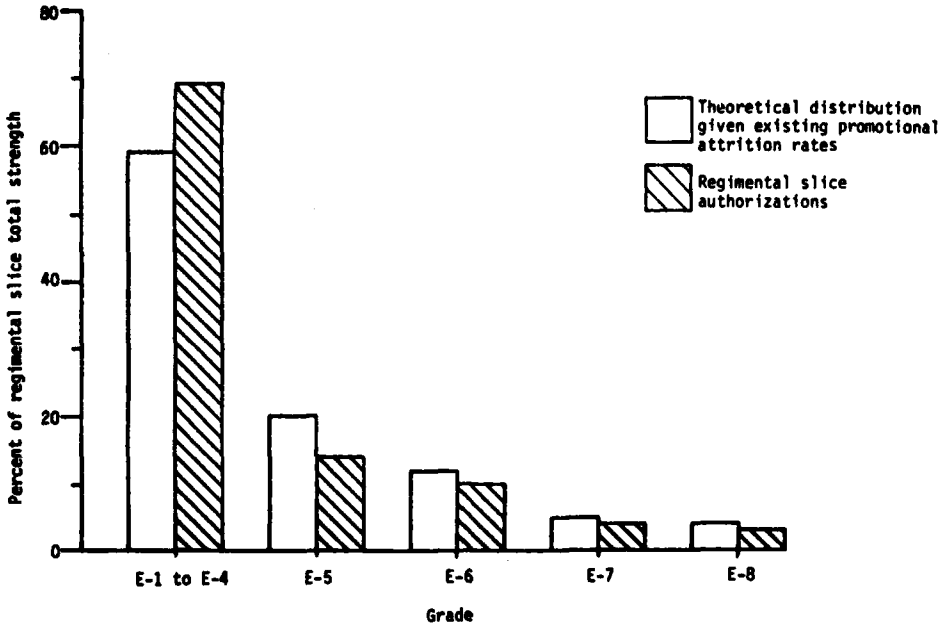


Figure 7-22. Theoretical vs Authorized Grade Distribution - 155SP Regiment

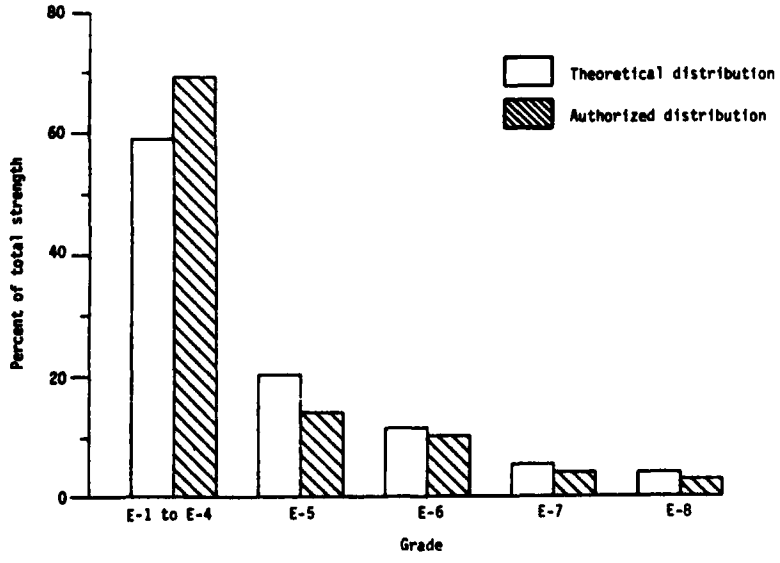


Figure 7-23. Theoretical vs Authorized Grade Distribution - CMF 13

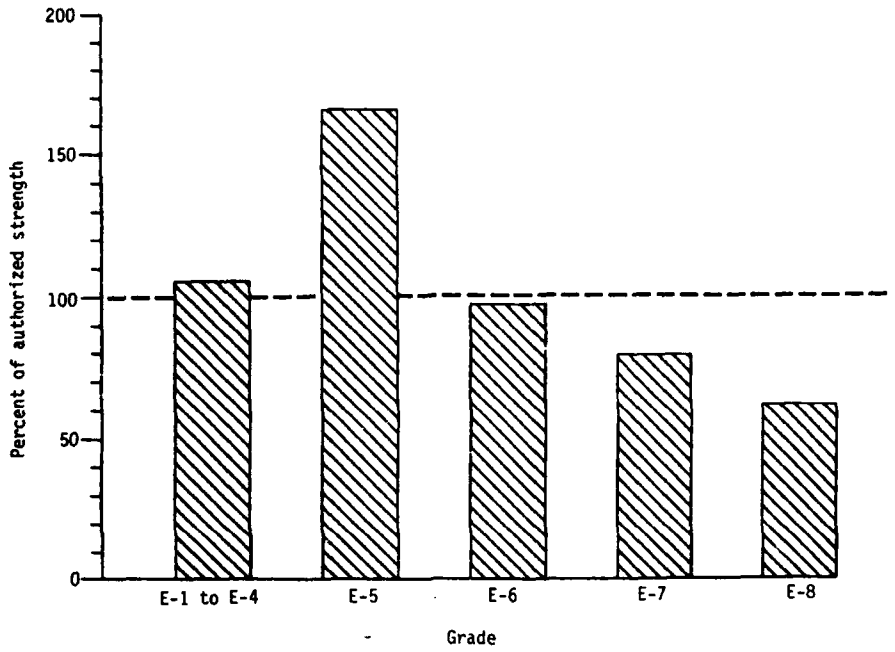


Figure 7-24. Actual vs Authorized Strength for CMF 13 Without Grade Substitution

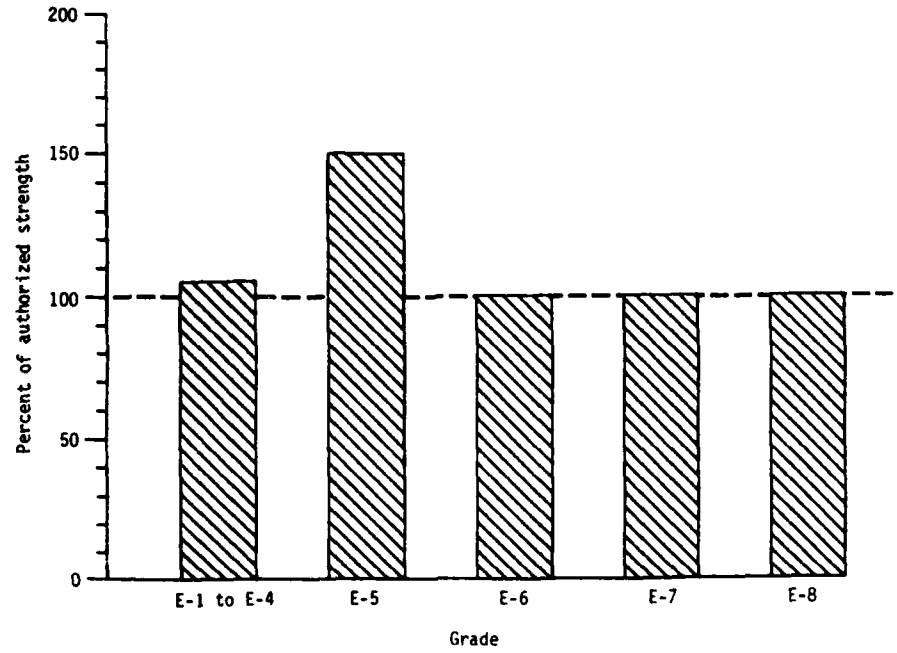


Figure 7-25. Actual vs Authorized Strength for CMF 13 With Grade Substitution

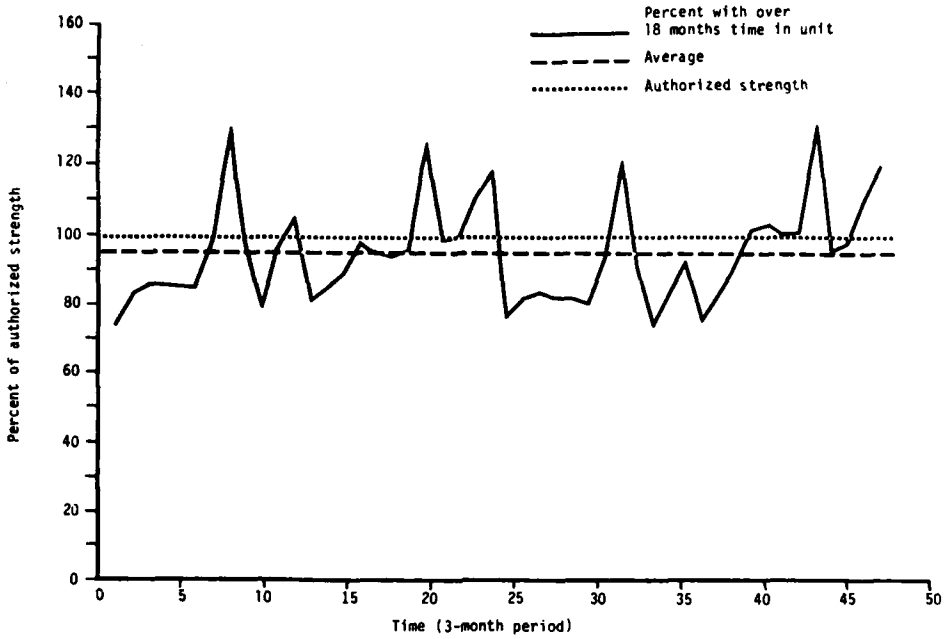


Figure 7-26. Percent of 155SP Battalion E-5 to E-8 Strength With 18 or More Months of Time in Unit

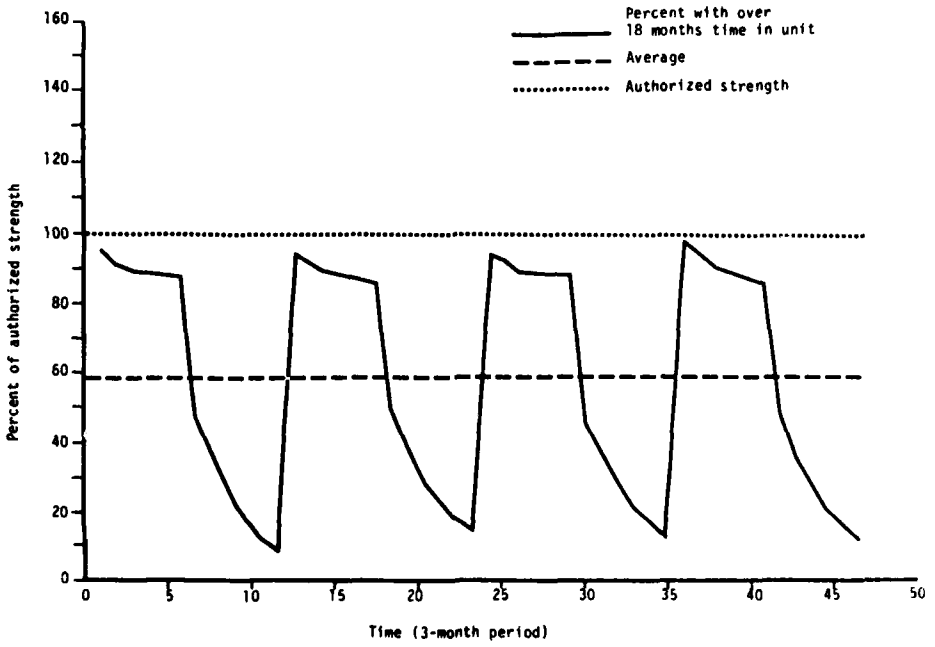


Figure 7-27. Percent of 155SP Battalion E-1 to E-4 Strength With 18 or More Months of Time in Unit

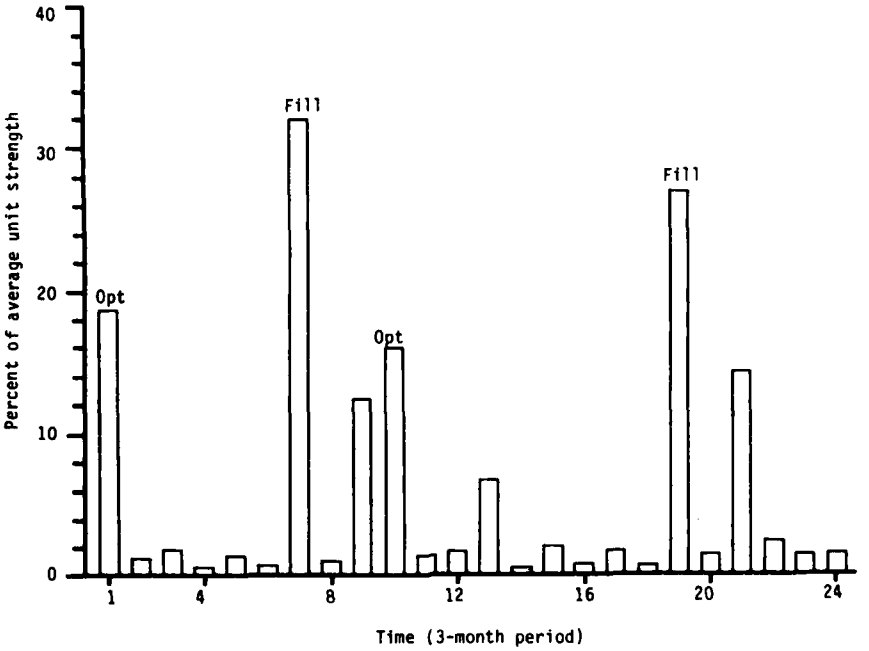


Figure 7-28. Percent Turnover per Quarter in 155SP Battalion

Table 7-11. CMF 13 Stabilized vs Unstabilized Unit Turnover

Regiment	Average unit turnover[a]					Yearly CONUS ERA
	Quarterly		Yearly[b]			
	Stabilized	Unstabilized	Stabilized	Unstabilized	Total	
155SP	2.8	23.5	9.3	15.6	24.9	[illegible]
8-in MLRS (Europe)	2.3	26.5	7.8	17.6	25.4	37.5
8-in MLRS (Hawaii)	2.4	26.5	8.0	17.7	25.7	35.5
155T (Hawaii)	1.9	27.1	6.4	18.1	24.5	68.5
155T (Korea)	2.7	24.0	8.9	16.0	24.9	50.8
105T (Bragg)[c]	N/A	N/A	N/A	N/A	32.2	42.5
105T (Campbell)	2.2	26.7	7.4	17.8	25.2	43.6
8-in SP	2.4	25.4	8.1	16.9	25.0	42.7
CMF average	2.6	24.5	8.7	16.3	25.1	40.8

[a] In percent of average strength.

[b] Assumes 3 1/3 stabilized periods and 2/3 unstabilized periods per year average.

[c] Battalions at Fort Bragg do not rotate.

e. Individual Careerist Statistics. Table 7-12 provides a summary of the major statistics on individual careers, which are essentially identical to those given for CMF 19. In general, the careerist impacts attributable to the rotation concept seem to be largely independent of CMF, although Figures 7-29 and 7-30 show a greater degree of variation in the observed values. This result is consistent with the fact that CMF 13 incorporates eight different stylizations, as opposed to only four regiment types in CMFs 11 and 19. The peculiarities in specific stylizations account for the distribution differences.

Table 7-12. CMF 13 Careerist Statistics

Grade	Rotational unit tour length (years)	Time spent in units (percent)	Time spent at homebase (percent)	Time spent in CONUS (years)	Time spent OCONUS (years)	Number of short tours
E-1 to E-4	3.0	91.1	42.3	2.1	1.8	0.1
E-5	4.1	71.1	50.5	4.8	2.8	0.2
E-6	4.2	65.0	51.2	8.0	4.2	0.4
E-7	4.6	65.1	43.4	9.9	6.2	0.4
E-8	4.7	61.1	39.3	13.1	8.7	0.6

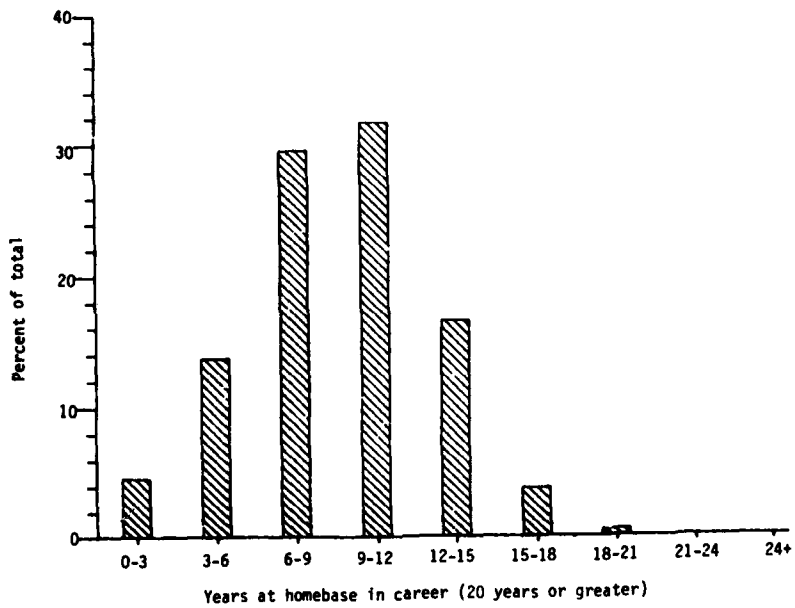


Figure 7-29. Distribution of Careerists by the Time Spent at Homebase for CMF 13

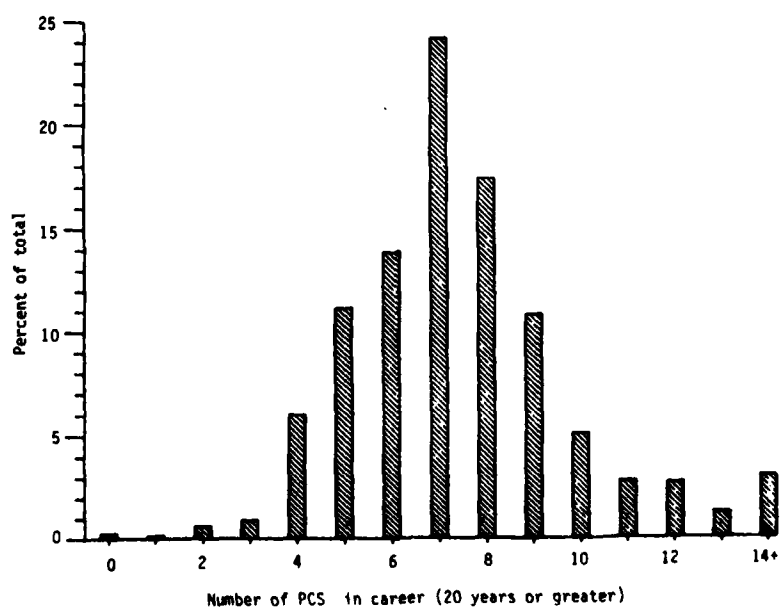


Figure 7-30. Distribution of Careerists by the Number of PCS for CMF 13

7-5. COST ANALYSIS. Costs were developed to determine the dollar impact of unit rotation/replacement versus the current individual replacement system. Using output from RPFM, RSAM and the FORCOST Model, costs for the battalion-size units in each regiment and for each regiment as a whole, under each movement concept, were determined for 30 years. A sensitivity analysis on unit rotation/replacement costs was conducted. Unit rotation costs were allowed to range from those for individual replacement (from the Army Force Cost Information System) to costs equaling a DCSPER Program and Budget Office estimate (PBO est) of $1,456/person. These two extremes are reported on in this chapter. Details concerning the cost analysis methodology, assumptions, and the results for all regiments are discussed in Appendix L. Only a brief synopsis of costs for each CMF follows:

a. CMF 11. Table 7-13 displays the total 30-year costs for all CMF 11 regiments combined (battalion-size and whole regiments). A comparison of costs, considering only battalion or equivalent size units, shows that for all infantry regiments combined (i.e., 23 MX regiments, 3 motorized regiments, etc.) CMF 11 unit rotation costs increase approximately 14 percent over individual replacement costs.

b. CMF 19. Table 7-14 displays the total 30-year cost for all CMF 19 units combined (battalion-size and whole regiments). A comparison of costs, considering only battalion or equivalent size units, shows that for all armor regiments combined (i.e., 24 armor regiments, 5 heavy cavalry regiments, etc.), CMF 19 unit rotation costs decrease 12 percent. This decrease in costs results from a commensurate decrease in personnel from ALO 2, the level used for costing.

c. CMF 13. Table 7-15 displays the total 30-year cost for all CMF 13 units combined (battalion-size units and whole regiments). A comparison of costs, considering only battalion or equivalent size units, shows that for all artillery regiments (i.e., 19 155SP regiments, 5 8-in MLRS regiments, etc.), CMF 13 costs under the unit rotation concept increase 11 percent. This increase in costs results from an equivalent increase of personnel in the regiments.

Table 7-13. CMF 11 Cost Summary (30-year cost, FY 81 dollars in billions)

Category	Pay & allowances	Other[a]	PCS	Total
Battalions				
Individual repl (FORCOST)	$14.9	$7.5	$1.2	$23.6
Unit rotation ($UR = $IR)[b]	17.0	8.5	1.5	27.0
Unit rotation (PBO est)	17.0	8.5	1.2	26.7
Regiments				
Unit rotation ($UR = $IR)	25.5	12.2	1.9	39.6
Unit rotation (PBO est)	25.5	12.2	1.6	39.3

[a] Other includes training costs and all OMA costs.

[b] Unit rotation costs per PCS equal individual replacement costs.

Table 7-14. CMF 19 Cost Summary (30-year cost, FY 81 dollars in billions)

Category	Pay & allowances	Other[a]	PCS	Total
Battalions				
Indiv repl (FORCOST)	$7.8	$4.6	$0.6	$13.0
Unit rot ($UR = $IR)[b]	7.1	3.7	0.6	11.4
Unit rot (PBO est)	7.1	3.7	0.6	11.4
Regiments				
Unit rot ($UR = $IR)	11.0	5.6	0.9	17.5
Unit rot (PBO est)	11.0	5.6	0.8	17.4

[a] Other - includes training costs and all OMA costs.

[b] Unit rotation costs per PCS equal individual replacement costs.

Table 7-15. CMF 13 Cost Summary (30-year cost, FY 81 dollars in billions)

Category	Pay & allowances	Other[a]	PCS	Total
Battalions				
Indiv Repl (FORCOST)	$11.1	$6.2	$1.0	$18.3
Unit Rot ($UR = $IR)[b]	12.0	6.5	1.4	19.9
Unit Rot (PBO Est)	12.0	6.5	1.1	19.6
Regiments				
Unit Rot ($UR = $IR)	19.4	10.1	1.7	31.2
Unit Rot (PBO Est)	19.4	10.1	1.5	31.0

[a]Other-includes training costs and all OMA costs.

[b]Unit rotation costs per PCS equal individual replacement costs.

d. Other Cost Observations

(1) On the average, PCS costs comprise 5 percent of the total personnel costs for a regiment. The remaining 95 percent are attributable to pay and allowances, training, and all OMA costs.

(2) A comparison of costs, considering only battalion or equivalent size units, shows that for all regiments encompassed by a given CMF:

(a) CMF 11 unit rotation costs increase 14 percent over individual replacement costs.

(b) CMF 19 costs decrease 12 percent.

(c) CMF 13 costs increase 8 percent.

(3) The increased manning levels required to support/sustain the rotational concept are the major contributors to the higher costs of the concept.

(4) The decrease in CMF 19 costs is due to the reduced manning/authorization requirements for armor-type units. If these requirements had been similar to those of infantry and artillery units, comparable increases in cost would have been noted.

(5) The number of PCS increased under unit rotation, and PCS costs increased from 4 to 29 percent depending on the PCS cost assumptions. However, the PCS cost increase did not contribute significantly to the total cost.

7-6. SUMMARY. This chapter has provided an examination of the impacts associated with the rotation concept, as consolidated for particular CMFs (11, 19 and 13). The results on a CMF-wide basis indicate that although minor variations are present in specific regiments, the major factors and considerations identified in Chapter 4 and supported in the MX regiment analysis of Chapter 6 are still valid. Chapter 8 provides a summary of the observations regarding the viability, implications, and impacts of the rotation concept and addresses the EEA specified in the tasking directive.

CHAPTER 8

RESULTS AND OBSERVATIONS

8-1. INTRODUCTION. The purposes of this chapter are to address the URSA I results with respect to the essential elements of analysis (EEA), to state additional key observations, and to summarize the overall study results.

8-2. ESSENTIAL ELEMENTS OF ANALYSIS. The EEA which were developed at the onset of the study and stated in the URSA I tasking directive (Appendix B) are addressed below.

a. In order to achieve a steady state unit replacement system, what are the requirements for or impact of:

(1) The First-Term Enlistment Period? The first-term enlistment period was assumed to be 3 years plus the initial entry training (IET) period. This EEA is addressed in paragraph 4-4 of this report. The variable reenlistment period (because of the different IET durations) is necessary to conform with the rotational concept of block FTG fill every 3 years. Implementation of this enlistment period would require an Army policy change.

(2) The Reenlistment Period? This EEA is also addressed in paragraph 4-4. Reenlistment periods were generally 36 months long but varied depending on the assignment. For rotating units, the reenlistment period must conform to the times of the careerist assignment (opt) windows. For the Six-Year Rotation Model, these windows may be 30 months or 42 months apart depending on the circumstances. Implementation of window-dependent reenlistment periods would also require an Army policy change.

(3) OCONUS Tour Lengths for Units and Individuals (FTG and careerists)? OCONUS tour lengths were defined by the Manning Task Force and were used to determine the specifics of the rotation model to be used. The details of the formulation of the rotation models are addressed in paragraphs 3-4 and 3-5. The tour lengths, are defined, as presented in Table 8-1.

Table 8-1. OCONUS Tour Lengths[a]

Category	OCONUS location			
	Europe	Korea	Hawaii	Other
Unit	3	1	2	3
FTG	18 Mo	1	3	3
Careerists	3	1	3	3

[a]Entries in years except where otherwise shown.

(4) CONUS Tour Lengths for Individuals and Rotational Units? CONUS tour lengths for both rotational units and the individuals in rotational units were defined by the unit rotation model applicable to the specific rotational battalion. In the European version of the Six-Year Rotation Model, the CONUS tour length for the rotational battalion is 3 years as opposed to 2 years in one version of the Korean model (see paragraphs 3-4 and 3-5). CONUS tour lengths for individuals in nonrotating units depend on the other personnel demands of nonrotating units.

(5) Training Period? The time necessary for a freshly filled unit to be considered as having attained an acceptable level of unit proficiency was assumed to be 3 months. This time period is based on discussions with the MTF and also on the fact that the simulation model addresses 3-month periods.

(6) The Unit Life Cycle for Replacement Units and Their Corresponding Personnel Packages? The replacement unit life cycles were assumed to be 3 years for units with Europe as the OCONUS location (e.g., the armored cavalry regiment) and 2 years for units with Korea as the OCONUS location. This assumption was based on the location-dependent OCONUS tour length. The life cycle for the replacement units is twice the OCONUS tour length time to allow for the formation of new replacement units.

(7) Unit Rotation Cycles? To achieve a steady state system, three distinct unit rotation cycles were defined as presented in paragraphs 3-4 and 3-5. The most commonly used was the European version of the Six-Year Rotation Model, as the vast majority of rotating units were for European requirements.

b. What is the impact of a unit replacement/rotation system on the parent unit in terms of:

(1) Training? Assignments/reassignments of personnel in rotating battalions are inflexibly scheduled, occur within a short time period, and affect sizable groups of people in the battalions. Accordingly, battalion training requirements can be identified and planned early by the parent unit.

(2) Logistics? Unit rotation creates specific periods where resource demands on parent units are large, as opposed to the more continuous, less fluctuating demand of the individual replacement system (e.g., issuing 20 rifles in 1 day versus one rifle every 20 days). The substantial population fluctuations occurring in battalions between FTG fills (i.e., battalions varying from 120 percent strength to 90 percent strength) cause significant variations of logistical demands (i.e., individual weapons, beds, transportation assets, etc.) over time. Additionally, when insufficient resources are available, negative impacts are exacerbated, and inequities are more difficult to distribute among all personnel. For example, if only 80 percent housing is available at an OCONUS installation, under the individual replacement concept one could have his family in quarters 80 percent of the time. Under the rotational concept, 80 percent of the families would be in quarters 100 percent of the time and the other 20 percent none of the time.

(3) Deployability? The unit rotation models are designed to prepare a battalion for deployment at a scheduled time. For example, in the Six-Year Rotation Model, the purpose of the careerist predeployment window is to allow those careerist assignments necessary for the unit to deploy OCONUS. The time allowed (6 months) for intensive training is oriented toward the OCONUS move. Prior to the predeployment window significant population fluctuations occur which make the unit less prepared for deployment (see Figure 3-1).

c. Under a unit replacement/rotation system, what are the demands for individual replacements? How can these demands be satisfied?

(1) There are two types of personnel replacement actions: block fill of FTG personnel entering the regiment and/or individual replacement of FTG and/or careerists. The characteristics and requirements for each type differ and are described below:

(a) Block Fill. The number of FTG necessary to support a unit rotation system depends on personnel attrition rates, the frequency of block fills, the minimum manning level requirements, and the specific rules governing FTG fill. The FTG block fill rules, as applied in the study, caused an increase in regimental manning levels of approximately 20 percent more (see paragraph 4-3) than would have been required under an individual replacement system. The impact of the FTG overfill could probably be lessened by a more judicious choice of FTG fill rules, but,

in any case, the number of FTG required to support the unit rotation system is significantly greater than that needed to support an individual replacement system. The satisfaction of these demands is an additional burden which will be placed on USAREC.

(b) Individual Replacement. Positions filled through individual replacement actions include careerist positions in nonrotating OCONUS battalions, TOE positions in echelons above battalion level, and TDA positions. Additionally, careerists entering or leaving a rotating battalion and all individuals in disbanded battalions are reassigned by individual replacement actions (see paragraph 4-5). The number of individual replacement assignments varies for each regiment. Analysis of the simulation results indicated that typically one-fourth to one-third of the total PCS assignments were individual replacement actions.

d. Can the current sustaining base support a unit replacement/rotation system? What are the implications for FORSCOM? How does this affect the homebase concept?

(1) The amount of FTG fill required to support the system depends on the specifics of the rotation concept and the degree of its implementation. For the rotation concept evaluated in this study, the FTG requirement is greater than is currently being supplied by the sustaining base. Additionally, the turnover rate in FORSCOM rotating unit assignments is significantly lower than in nonrotating unit assignments (see Chapters 4 and 7).

(2) Homebasing was a concept requirement. Results of the analysis indicate that FTG personnel and lower grade NCOs can generally be located in a homebase during CONUS assignments. Higher grade NCOs, however, must spend less time at the homebase because of the significantly higher demands for these individuals in the Other CONUS ERA (see Chapter 7, Tables 7-4, 7-8, and 7-12).

e. What will be the implications of a unit replacement/rotation system for USAREC and TRADOC?

(1) A greater number of FTG personnel must be recruited to supply the increased manning level needed to support the unit rotation system. Personnel actions, especially recruitment actions, must occur according to regimental requirements. Enlistments must be coordinated with the FTG fill windows of the receiving regiment, which means that individuals must be recruited far enough in advance of the fill window to allow for MOS specific IET time requirements.

(2) The implications of these requirements are that USAREC and TRADOC must be capable of handling more people and that the management of FTG personnel (individually and collectively) from recruitment until delivery to the regiment may require an extensive centralized system.

f. What will the personnel distribution formula be at allowable points in the replacement/rotation cycle?

(1) A regimental distribution formula depends on the force structure of the regiment, the location(s) of the OCONUS battalions, and the unit rotation/replacement cycles in effect. Therefore, the distribution of personnel varies considerably with each regimental stylization.

(2) There is no movement of careerists from one rotating unit to another rotating unit. In general, the CONUS nonrotating battalions and ERA (CONUS homebase and other CONUS) are the focal point for all individual movement actions within the regiments. This often resulted in reduced turnaround times for these assignments.

(3) The steady state distribution of personnel for one of the stylized regiments analyzed in this study was shown in Figure 6-23 and discussed in paragraph 6-3.

g. How do the dollar costs associated with a unit replacement/rotation system compare to the dollar costs of the current individual replacement system, as would apply in the Army 86 structure?

(1) A comparison of the 30-year costs associated with CMF 11, 13, and 19 personnel in battalion or equivalent size units for all regiments under each replacement system indicates that:

(a) CMF 11 unit rotation costs increase 14 percent over individual replacement costs.

(b) CMF 19 costs decrease 12 percent.

(c) CMF 13 costs increase 8 percent.

(2) The increased manning levels required to support/sustain the rotational concept are the major contributor to the higher costs. The decrease in CMF 19 costs is due to the reduced personnel requirements for the armor units. If these requirements had been similar to those of infantry and artillery units, comparable increases in cost would have been noted.

(3) The number of PCS increased under unit rotation. The PCS cost increase did not contribute significantly to the total costs since, on the average, PCS costs comprise only 5 percent of the total personnel costs for a regiment. The remaining 95 percent are attributable to pay and allowances, training, and all OMA costs.

h. What insights have been gained from the analysis of the steady state system which may assist in a transition from the current individual replacement system?

(1) The conduct of this analysis has shown that policy and system changes are required to implement unit rotation, e.g., development of a personnel management system designed to handle the needs of the rotating units, development of a sustaining base to meet increased manning requirements, and development of logistics systems sufficiently flexible to accommodate battalion level strength fluctuations. Additional policy requirements are addressed in Appendix F.

(2) The major insight gained from the analysis is that the changes in Army policies, structure, manning requirements, etc. are complex and far-reaching. Transition to the unit rotation system must be approached in a very well-planned, methodical manner.

i. What is the relative impact of the following personnel policy modifications to the basic New Manning System (NMS) concept?

- Within a 6-year rotational unit tour, requiring careerists in the rotational units to serve at least 3 continuous years with the same unit as opposed to a requirement to serve at least 1 year with the same unit.

- Force E-5 and below personnel in extraregimental assignments (ERA) who have never served in the regiment's rotational units into one of the rotational units on subsequent assignments. Examine the following rates of such forced reassignment: 100 percent and 0 percent.

- Careerist opt-out points aligned with the first-term group (FTG) fill points for rotational units, as opposed to the base case concept of redeployment and predeployment careerist opt-out points in the CONUS unit tour period. (For battalion replacement, aligned fill and opt-out points are required and coincide with the first and last time step of the replacement cycle.)

- Block fill of FTG packages to the regiment's quota of ERA positions coincident with one FTG fill points to the regiment's rotational units, as opposed to allowing the FTG ERA positions to be filled whenever shortages occur, i.e., "trickle fill."

(1) This EEA is addressed in the analysis contained in Section II of Chapter 5. With the exception of the second EEA policy modification (the forcing of E-5 and below ERA personnel into rotational units was not evaluated per discussion with the MTF), a parametric analysis of each policy modification was conducted.

(2) The third EEA policy modification (i.e., alignment versus nonalignment) was found to have the most effect on the MOE/MOC. The most important effects observed were:

(a) The nonaligned states achieved a higher level of unit stability over the FTG fill windows.

(b) The aligned state significantly reduced the average rotational unit critical shortfall of trained personnel, raised the percentage of time the rotational unit is above ALO 3 in CONUS, and significantly reduced the Europe ERA turnover rate.

(c) The differences in the expected number of individual PCS during a career of 20 or more years were not large; however, the aligned case caused more PCS to occur at the mid-point of the CONUS rotational unit tour, thereby causing a significant disruption in location stability for the careerist with accompanying dependents. Therefore, the nonaligned case was selected for use by the MTF.

8-3. KEY OBSERVATIONS

a. Regimental System Flexibility. Within the regimental system, rotational battalions must be linked by common TOE and movement schedules. Individual assignments are based on regimental needs, and units/individuals establish roots at a single CONUS location. These conditions result in an inherently rigid regimental system; therefore, changes to the structure and/or operational characteristics will require more planning than with the present system.

b. Contingency Operations. Contingency operations are normally a combined arms effort (infantry, armor, artillery, etc.); therefore, many regiments across several CMFs could be affected. The total impact of a contingency operation depends on the size of the contingency force and the duration of the stay OCONUS. For short durations, the impact is localized to the deploying regiments, and reassignment actions may simply be postponed. For durations sufficiently long that further delays in scheduled unit/individual reassignments become impractical, the impact may be felt across the CMF(s). Unit rotations, at least in the regiments with deployed battalions, would require curtailment, and an individual replacement system supported by the remainder of the CMF would become necessary.

c. Nondeployable Personnel. The unit rotation concept requires individuals assigned to a rotating unit to remain with the unit through at least one OCONUS assignment. Accordingly, if personnel assigned to the regiment are nondeployable, their assignments would be limited to the CONUS ERA exclusively. The impact of this is that fewer CONUS positions are available for OCONUS individual returnees.

d. Careerist Movement. Some careerists (especially some E-4 and E-5 careerists) become excess to the rotating battalions at the time of the FTG fill due to the FTG block fill rules. These individuals cannot leave the unit until the next careerist assignment window. The departure of these careerists at the FTG fill periods would not impact the battalion adversely; however, the rules governing FTG fill periods do not allow this.

8-4. SUMMARY

a. Personnel stability in rotating battalions is significantly increased under the unit rotation concept; however, several direct costs are incurred. Among these are the need for more recruits to support the required higher manning levels, the significant variations in strength between the FTG fill periods in rotating battalions, the high turnover rates in CONUS ERA positions, and higher dollar costs. Individual replacement remains a significant aspect of the concept and must be managed along with unit rotation. Because paired rotating battalions must be identically organized and equipped, new equipment must be distributed equally between those units whether they are in CONUS or OCONUS. Generally, the study did not reveal any problems which would preclude implementation of the unit rotation concept.

b. The Unit Rotation/Replacement System Analysis Model (URSAM) is available to the study sponsor for follow-on analyses. Due to its size and complexity, it will remain at CAA. URSA II, a follow-on study, is being conducted by CAA.

APPENDIX A

STUDY CONTRIBUTORS

1. STUDY TEAM

a. Study Directors

LTC David R. Holdsworth, Requirements Directorate
MAJ(P) Stephen C. Rinehart

b. Team Members

LTC Robert W. Gesner
LTC Lawrence D. Brooks
MAJ William L. Carr
MAJ Thomas L. Jameson
MAJ Charles B. Torres
MAJ Kenneth M. Wanless
CPT Thomas W. Ogilvy
Mr. John A. Merna
Mr. James V. O'Brien
Mr. Kenneth R. Simmons
Mrs. Joann W. Vines
Cadet Rui Cuhna

c. Support Personnel

(1) Editor

MAJ John L. Herring

(2) Statistical Analysis Support

Mr. Carl B. Bates, Methodology and Computer Support Directorate

(3) Graphic Arts Center

SFC Moeolo Taamai
SSG Rowen G. AmBery
SSG Terry Barton
SSG Richard I. Loller
SP6 William Hartl
SP5 Trevor Craner
SP4 Peter Morlock
Mrs. Judy L. Rosenthal

(4) Secretarial Support

Ms Stephanie D. Blom
Ms Ruth Brody
Ms Betsy R. Eliot
Ms Thelma L. Laufer, Methodology and Computer Support Directorate
Ms Harriet Pulsifer, Office of the Chief of Staff

(5) Word Processing Center

Ms Carrie Allen
Mr. Raymond Finkleman
Ms Joyce W. Garris
Ms Nancy M. Lawrence
Ms Anne Martin
Ms Deborah Prillaman
Ms Pat Williams

2. PRODUCT REVIEW BOARD

LTC Robert D. Kerr, Chairman, Joint Forces and Strategy Directorate
Mr. John W. Warren, Methodology and Computer Support Directorate
Mr. Joel Levy, Requirements Directorate

APPENDIX B

STUDY DIRECTIVE

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, D.C. 20310

REPLY TO ATTENTION OF

DAPE-ZXB

4 June 1981

SUBJECT: Study - Unit Replacement System Analysis (URSA)

Commander
US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland 20014

1. STUDY TITLE. Unit Replacement System Analysis (URSA).

2. BACKGROUND

a. In May 1980, the Chief of Staff, Army (CSA) directed the initiation of the Army Cohesion and Stability (ARCOST) Study to analyze how to create an Army with reduced turbulence, increased stability, and enhanced cohesion. The ARCOST Study concluded that the current individual replacement system creates excessive turbulence in units and inhibits unit cohesion and integrity. As a recommendation, the study suggested that the Army begin a unit replacement system on a small scale, increasing its scope as the Army learns how to support unit replacement.

b. Subsequently, in July 1980, the CSA tasked the DA DCSOPS to begin a process leading to evaluating a unit replacement system on a small scale. This led to a proposal presented 19 December 1980 to the CSA for a Company Replacement Package (C-REP) evaluation involving 19 companies over a 3-year period. At that C-REP briefing, there was considerable discussion about managing a company replacement system. In particular, it was affirmed that the Army should know what the end picture will look like before starting and whether the Army can adopt the necessary management practices. Visualizing the end picture, referred to as the steady state, became an important planning objective by which the Army can determine how to move from the C-REP evaluation of a small number of companies to an Army-wide replacement system.

c. On 13 March 1981, by letter, DACS-FM, subject: Study - Unit Replacement System Analysis (URSA), the US Army Concepts Analysis Agency (CAA) was tasked to conduct an analysis of a peacetime steady state unit replacement system, within the framework of a DA-approved regimental concept. This study directive resulted from the recognition that analysis of unit replacement in the steady state will provide such management insights.

d. On 30 March 1981, The Inspector General (TIG) presented the CSA with the results of a functional review of alternative personnel replacement systems. Within TIG's report was a recommendation to assign proponency for development of a new manning system to the Deputy Chief of Staff for Personnel (DCSPER).

DAPE-ZXB
SUBJECT: Study - Unit Replacement System Analysis (URSA)

e. On 20 April 1981, by HQDA letter 570-81-2, subject: Development of New Manning System, DA DCSPER was tasked to develop a new manning system that is primarily a unit replacement or rotation system which can be supplemented by an individual replacement system. That tasking included assuming the proponency for the CAA analytical efforts. In response to that tasking, the DA DCSPER established the Special Assistant for Manning. As a result of the TIG report and further consideration of the requirements for analysis of a unit replacement or rotation system, this study directive supersedes the letter of 13 March 1981 (paragraph c, above). Further, it is recognized that necessary and sufficient conditions for feasibility and sustainability must first be established for a peacetime steady state system, this portion of the effort is tasked to CAA.

3. STUDY SPONSOR. Special Assistant for Manning, Office of the Deputy Chief of Staff for Personnel.

4. STUDY AGENCY. US Army Concepts Analysis Agency (CAA).

5. TERMS OF REFERENCE

a. Problem. The current Army individual replacement system is turbulent; it does not promote cohesion and stability, and, thereby, detracts from the unit operational effectiveness objective of maintaining trained personnel on equipment for the maximum period of time. Before going to a unit replacement/rotation system, an evaluation of how such a system will work is needed.

b. Purpose. To assist DA by analyzing the steady state of a unit replacement/rotation system operating within a regimental system. This analysis will yield information on major Army policies, systems, and resources which may be required to make the unit replacement/rotation system viable.

c. Definitions

(1) Steady State. The steady state for a unit replacement/rotation system is the eventual condition which occurs, and can be sustained, after the start-up or transition phase is complete. The steady state is exemplified by a smooth rotation of units between CONUS and OCONUS stations supported by a personnel system which provides a sufficient supply of trained individuals.

(2) Stabilization. Stability is keeping soldiers together in units longer. The stability of a soldier is measured by tenure in his unit rather than his tour length at a location. To achieve this goal, there will be a corresponding need for stabilization in manpower and the force structure.

(3) Unit Rotation. The movement of units from a CONUS homebase to OCONUS and back. This may involve the rotation of battalions within which companies are periodically replenished with groups of first-termers; rotating companies, or smaller units. The concept envisions concurrent employment of the individual replacement system.

(4) Unit Replacement. To disestablish a unit at the end of a tour and replace it with a newly deployed unit as opposed to rotating the old and new units.

(5) Homebasing. This term conveys dual goals: all units in the regimental system will have a CONUS homebase which will also be the permanent location of the regimental colors. A corollary intent is to provide career soldiers a CONUS homebase to which they will be assigned whenever possible.

(6) Regimental Affiliation. The continuous association or identification of a soldier with a single regiment, unit, or institution throughout his career.

d. Objectives

(1) Develop a model by which to analyze, in the steady state, the feasibility and sustainability of a peacetime unit replacement/rotation system within the framework of a regimental umbrella. This model must be so documented as to allow the study sponsor to continue follow-on analyses.

(2) Identify the impact on DA management of a steady state unit replacement/rotation system in the areas of:

(a) Personnel policies and procedures.

(b) Distribution of TRADOC, FORSCOM, USAREC, and OCONUS resources.

(3) Identify major resource implications (manpower and dollar) associated with the steady state unit replacement/rotation system.

(4) Within the framework of the steady state system model developed, examine the impact of deploying a brigade-size CONUS force on a contingency mission.

(5) Provide to the study sponsor, IAW paragraph 10b, emerging insights in the following areas:

(a) Necessary and/or recommended changes to the replacement/rotation concept under analysis to improve feasibility and sustainability, improve unit operational effectiveness, reduce cost, or reduce significant adverse impacts.

DAPE-ZXB
SUBJECT: Study - Unit Replacement System Analysis (URSA)

(b) Long lead time major actions required to implement the concept.

(c) Significant results on any of the essential elements of analysis.

e. Scope

(1) The unit replacement/rotation system will be analyzed for peacetime conditions, within the framework of a regimental system. (The regimental system concept will be that as provided by the Manning System Task Force.)

(2) Europe, Panama, Alaska, Hawaii, and Korea will be the OCONUS tours considered.

f. Limitations

(1) The company or battalion will be the replacement/rotation unit. Replacement or rotation will be between like type units.

(2) Currently planned Army personnel end strength contained in POM 82-86 applies.

(3) Type units to be considered are infantry (light and mechanized), armor, and cannon field artillery.

(4) Military occupational specialties (MOS) to be considered in detail (i.e., worldwide requirements) are 11, 13, and 19 for enlisted personnel and the equivalent MOS for officers. All MOS within the TOE of a replacement/rotational unit are to be considered within the framework of that unit.

g. Constraints. None.

h. Timeframe. FY 86 will be the study base year.

i. Force. The Army 86 force portrayed in TAA 87.5 (Army 86 Excursion to TAA 87) with known adjustments for TAA 88 available on 30 March 1981.

j. Assumptions

(1) USAREC can recruit sufficient personnel for the military occupational specialties required to support a unit replacement/rotation system.

DAPE-ZXB
SUBJECT: Study - Unit Replacement System Analysis (URSA)

(2) Facilities will exist to support a unit replacement/rotation system.

(3) Current promotion and attrition rates will apply.

(4) Grade substitution (to next higher grade) will be permitted during unit predeployment and postredeployment fill periods.

(5) Grade substitution (one up/one back) will be permitted during the stabilization periods to minimize turbulence.

(6) The number of OCONUS units subject to replacement/rotation, by type TOE, will not exceed the number currently envisioned being stationed OCONUS under Army 86/Division 86.

(7) Conversion to Army 86/Division 86 will not change the by grade and MOS end strength of the Army.

(8) Legislation will exist to allow variable enlistment periods. All first-term enlistment periods will be equal to 36 months plus the MOS-peculiar individual entry training (IET) period.

(9) The active components of Army 86 will remain a total "volunteer" Army.

k. Essential Elements of Analysis (EEA)

(1) In order to achieve a steady state unit replacement system, what are the requirements for/or impact of:

(a) First term enlistment period?

(b) Reenlistment period?

(c) OCONUS tour lengths for both units and individuals?

(d) CONUS tour lengths for both units and individuals?

(e) Training period?

(f) Unit life cycle for replacement units/personnel packages?

(g) Unit rotation cycle for rotational units?

(2) What is the impact of a unit replacement/rotation system on the parent unit in terms of training, logistics, and deployability?

(3) Under a unit replacement/rotation system, what are the demands for individual replacements? How can these demands be satisfied?

DAPE-ZXB
SUBJECT: Study - Unit Replacement System Analysis (URSA)

(4) Can the current sustaining base support a unit replacement/rotation system? What are the implications for FORSCOM? How does this affect the homebase concept?

(5) What will be the implications of a unit replacement/rotation system for USAREC and TRADOC?

(6) What will the personnel distribution formulae be at allowable points in the replacement/rotation cycle?

(7) How do the dollar costs associated with a unit replacement/rotation system compare to the dollar costs of the current individual replacement systems, as would apply in the Army 86 structure?

(8) What insights have been gained from the analysis of the steady state system which may assist in a transition from the current individual replacement system?

7. RESPONSIBILITIES. The ARSTAF, TRADOC, FORSCOM, OCE, and USAREC will provide input data as required upon request from CAA or the study sponsor. Requirements for input data are anticipated to be, but are not limited to, the following:

a. ODCSOPS. Stationing, force structure, unit training, and individual training data.

b. ODCSPER. Personnel management data.

c. ODCSLOG. Logistical data.

d. MILPERCEN. Attrition, reenlistment, and promotion rates, and personnel authorizations data.

e. TRADOC. Training data.

f. FORSCOM. Training data.

g. USAREC. Enlistment data.

h. OCE. Facilities data.

i. COMPTROLLER. Costing data.

8. LITERATURE SEARCH

a. Organizations/Offices Interested

(1) OCSA

DAPE-ZXB
SUBJECT: Study - Unit Replacement System Analysis (URSA)

(2) DA, DCSOPS

(3) DA, DCSLOG

(4) DA, DCSPER

(5) DA, Comptroller

(6) DA, PAE

(7) DAIG

(8) MILPERCEN

(9) TRADOC

(10) FORSCOM

(11) USAREC

(12) EUSA

(13) USAREUR

(14) OCE

(15) CAA

b. Studies

(1) Army Cohesion and Stability (ARCOST) Study.

(2) Army Training Resource Requirement System (ATRRS) Study.

(3) People Management (Kaplan) Study.

9. REFERENCES

a. HQDA letter 570-81-2, 20 April 1981, subject: Development of New Manning System.

b. Chief of Staff Memorandum, 5 March 1981, subject: The Army Personnel System Review.

c. Chief of Staff Memorandum, 14 January 1981, subject: The Army Personnel Replacement System.

d. Army Cohesion and Stability (ARCOST) Study, May 1980.

DAPE-ZXB
SUBJECT: Study - Unit Replacement System Analysis (URSA)

e. FORSCOM Cohesive Unit Project (CUP) proposal.

f. ODCSOPS Company Replacement Package (C-REP) proposal.

g. Army Staff Council Meeting regarding C-REP, 19 December 1980.

h. Army Training Resource Requirement System (ATRSS) Study, 22 October 1976.

i. People Management (Kaplan) Study, 25 April 1975 (and update January 1981).

j. Army Regulation 5-5, The Army Study System, w/C1, 15 April 1978.

k. Letter, DACS-FM, 13 March 1981, subject: Study-Unit Replacement System Analysis (URSA).

10. ADMINISTRATION

a. Milestone Schedule. See Inclosure.

b. Control Procedures. A Study Advisory Group (SAG) will monitor this study. The SAG will be chaired by the Special Assistant for Manning, DA DCSPER, and consist of general officer members from ODCSOPS, ODCSPER, ODCSLOG, AFMCO, MILPERCEN, DAIG, DACS-PAE, OCOA, OCAR, NGB, TRADOC, FORSCOM, USAREC, USAREUR, EUSA, WESCOM, and OCE. Interim reports will be provided to the SAG and/or the Manning System Task Force, as directed by the study sponsor.

c. Office/Point of Contact. DAPE-ZXB (MAJ David Tye) is the point of contact for the study (telephone 695-1900/1350). For the purpose of data collection, direct coordination is authorized between CAA and supporting commands and staffs.

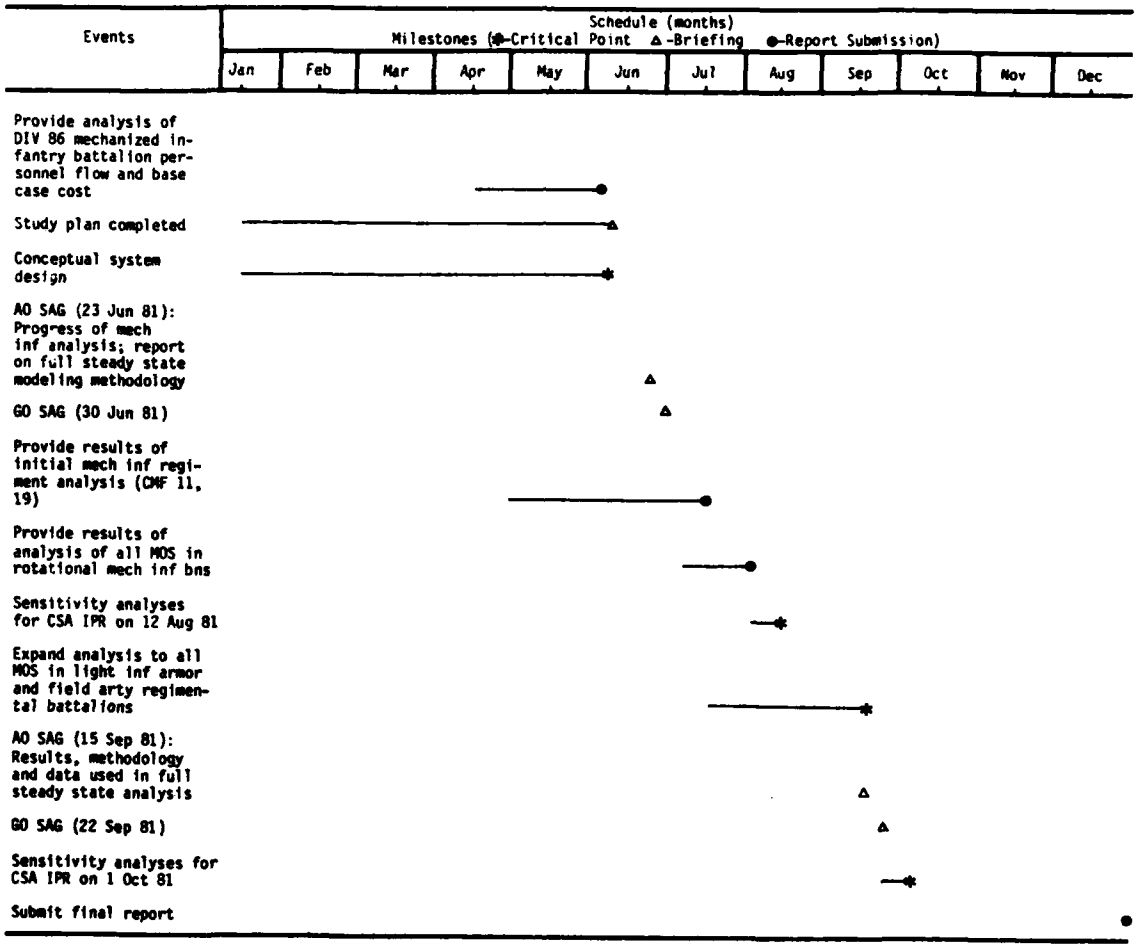
d. Coordination. This study directive has been coordinated with CAA IAW paragraph 4, AR 10-38.

Charles W. Bagnal

1 Incl
as

CHARLES W. BAGNAL
Major General, USA
Special Assistant for Manning to
the Deputy Chief of Staff for
Personnel

Inclosure 1


Events
Schedule (months)
Milestones (✱-Critical Point △-Briefing ●-Report Submission)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Provide analysis of DIV 86 mechanized infantry battalion personnel flow and base case cost
Study plan completed
Conceptual system design
AO SAG (23 Jun 81): Progress of mech inf analysis; report on full steady state modeling methodology
GO SAG (30 Jun 81)
Provide results of initial mech inf regiment analysis (CMF 11, 19)
Provide results of analysis of all MOS in rotational mech inf bns
Sensitivity analyses for CSA IPR on 12 Aug 81
Expand analysis to all MOS in light inf armor and field arty regimental battalions
AO SAG (15 Sep 81): Results, methodology and data used in full steady state analysis
GO SAG (22 Sep 81)
Sensitivity analyses for CSA IPR on 1 Oct 81
Submit final report

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, DC 20310

REPLY TO ATTENTION OF

19 OCT 1981

DAPE-ZXB

SUBJECT: Revision to Study-Unit Replacement System Analysis (URSA)

Commander
US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, MD 20814

1. BACKGROUND.

a. As a result of concerns expressed by MACOM Commanders and ARSTAF representatives attending the 20 August 1981 Chief of Staff, Army (CSA) In Progress Review (IPR) on the New Manning System (NMS), General Meyer, during the IPR, stated that the expressed concerns would be addressed in October 1981. The study sponsor, in reviewing the expressed concerns, and the emerging conceptual insights to date, determined that selected additional analysis using the stylized mechanized infantry regiment base case would suffice to respond to the concerns raised in the CSA IPR. This analysis, being an excursion from the original NMS concept, and not part of the planned sensitivity analysis, is requested to be performed prior to completion of the full steady state analysis for all combat arms regiments. As such, selected paragraphs of the original study directive are changed as indicated in paragraph 2, below.

b. During the CSA IPR (reference m), the study sponsor announced that an extension to URSA was being initiated to examine company level rotation and replacement concepts for comparison with the battalion level analysis currently in progress at CAA. This extension will take the form of a second study, hereafter referred to as URSA II. The on-going URSA Study will hereafter be referred to as URSA I, to eliminate potential confusion.

c. During the 17 August 1981 coordination meeting (reference 1), it was agreed that the study terms of reference should be updated to reflect the latest guidance being incorporated into the base case analyses. These revisions are also reflected in the changes in paragraph 2.

DAPE-ZXB 6 OCT 198
SUBJECT: Revision to Study-Unit Replacement System Analysis (URSA)

2. CHANGES TO STUDY DIRECTIVE. Letter, DAPE-ZXB, 4 June 1981, subject: Study-Unit Replacement System Analysis (URSA) is changed as follows:

a. Paragraphs 1 through 4. No change.

b. Paragraph 5, subparagraphs a through e. No change.

c. Subparagraph 5f.

(1) Change subparagraph (1) to read:

The battalion will be the replacement /rotation unit. Replacement or rotation will be between like type units.

(2) Subparagraph (2) through (4). No change.

d. Subparagraphs 5g and 5h. No change.

e. Subparagraph 5i. Change to read: The Army 86 force portrayed in TAA 87.5 (Army 86 Excursion to TAA 87) with known adjustments provided by the Division 86 Transition Planning and Implementation Group, Requirements Directorate, DA DCSOPS, as of 14 August 1981.

f. Subparagraph 5j.

(1) Subparagraphs (1) through (6). No change.

(2) Subparagraph (7). Changed to read: Conversion to Army 86/Division 86 will not change the by grade, MOS or officer specialty end strength of the Army.

(3) Subparagraphs (8) and (9). No change.

(4) Add the following subparagraph: (10). The by grade and MOS authorizations for TDA positions, positions in TOE echelons above battalion and positions in separate TOE units of smaller than battalion equivalent size will remain the same for the steady state as they are reflected in the Army Authorization Document System (TAADS) as of 2 July 1981.

g. Subparagraph 5k. Add the following subparagraph: (9). Examine the relative impact of the following personnel policy modifications to the basic NMS concept.

(a) Within a 6-year rotational unit tour, requiring careerists in the rotational units to serve at least 3 continuous years with the same unit as opposed to a requirement to serve at least 4 continuous years with the same unit.

DAPE-ZXB

SUBJECT: Revision to Study-Unit Replacement System Analysis (URSA)

(b) Force E5 and below personnel in extra regimental assignments (ERA) who have never served in the Regiment's rotational units, into one of the rotational units on subsequent assignments. Examine the following rates of such forced reassignment: 100% and 0 %.

(c) Careerist opt-out points aligned with the first term group (FTG) fill points for rotational units, as opposed to the base case concept of redeployment and predeployment careerist opt-out points in the CONUS unit tour period. (For battalion replacement, aligned fill and opt-out points are required and coincide with the first and last time step of the replacement cycle.)

(d) Block fill of FTG packages to the regiment's quota of ERA positions coincident with the FTG fill points to the regiment's rotational units, as opposed to allowing the FTG ERA positions to be filled whenever shortages occur (trickle fill).

h. Paragraphs 7 and 8. No change.

i. Paragraph 9. Add the following subparagraphs:

1. Coordination meeting between four representatives of the New Manning System Task Force and the Unit Replacement System Analysis study team at USACAA on 17 Aug 81, subject: Review of Assumptions and Key Policy Values Used in the URSA Model (URSAM).

m. MFR, DAPE-ZXB, 25 August 1981, subject: New Manning System in Progress Review (IPR) for CSA - 20 Aug 81.

j. Paragraph 10. No change.

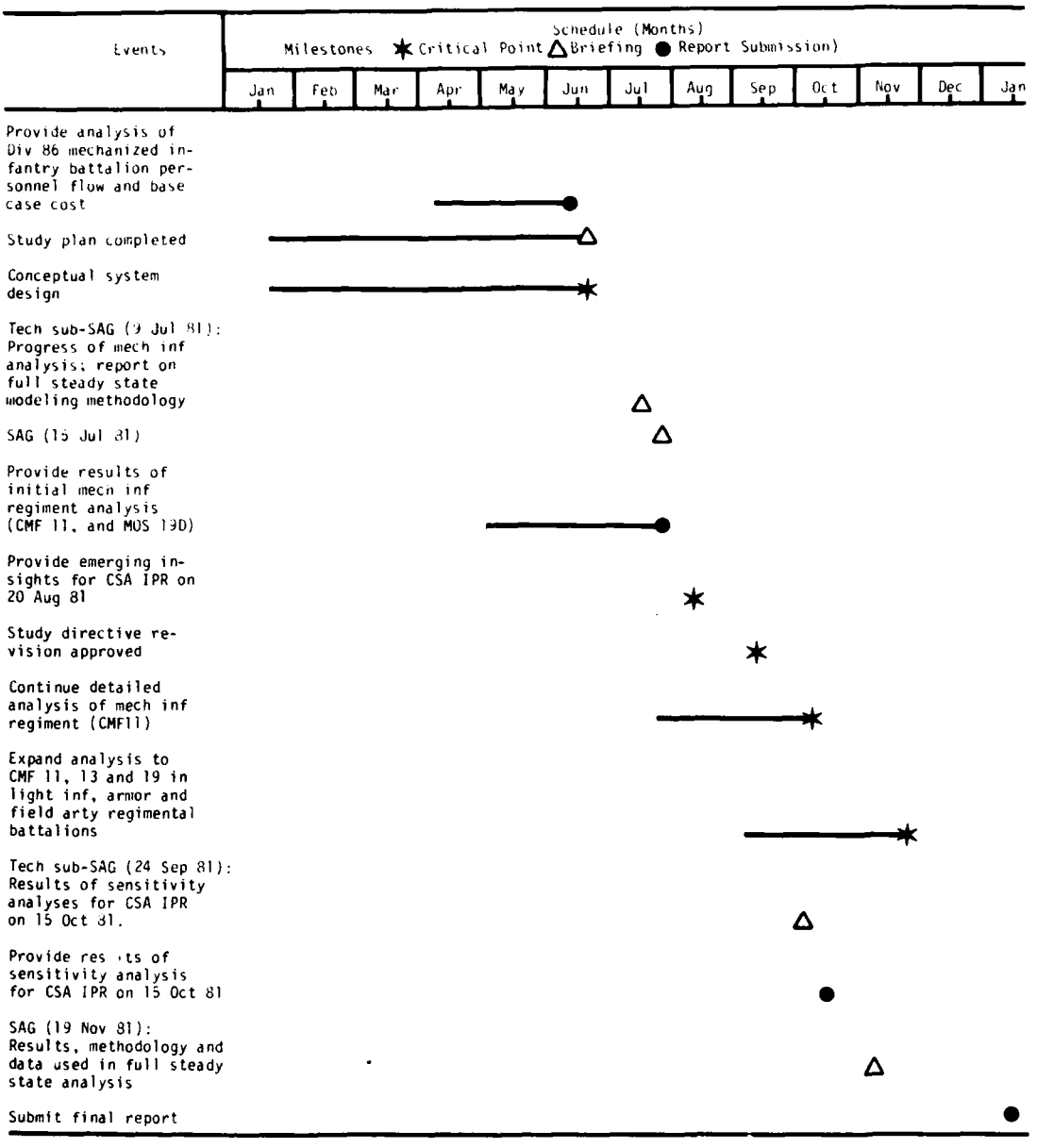
k. Inclosure 1. Replaced by the milestone schedule at inclosure 1.

3. The Manning Task Force is organized at the directorate level within DA DCSPER. COL Tom Weber is the director of the task force and as such is my principal operator with respect to the Unit Replacement System Analysis effort. Issues which should be elevated to general officer level are to be brought to my attention.

1 Incl

M. R. THURMAN
Lieutenant General, GS
Deputy Chief of Staff
for Personnel

Inclosure 1


Events
Schedule (Months)
Milestones ✱ Critical Point △ Briefing ● Report Submission)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Provide analysis of Div 86 mechanized infantry battalion personnel flow and base case cost
Study plan completed
Conceptual system design
Tech sub-SAG (9 Jul 81): Progress of mech inf analysis; report on full steady state modeling methodology
SAG (15 Jul 81)
Provide results of initial mech inf regiment analysis (CMF 11, and MOS 19D)
Provide emerging insights for CSA IPR on 20 Aug 81
Study directive revision approved
Continue detailed analysis of mech inf regiment (CMF11)
Expand analysis to CMF 11, 13 and 19 in light inf, armor and field arty regimental battalions
Tech sub-SAG (24 Sep 81): Results of sensitivity analyses for CSA IPR on 15 Oct 81.
Provide results of sensitivity analysis for CSA IPR on 15 Oct 81
SAG (19 Nov 81): Results, methodology and data used in full steady state analysis
Submit final report

APPENDIX C

REFERENCES AND BIBLIOGRAPHY

REFERENCES

1. Manning Task Force Concept Paper, ODCSOPS, 12 June 1981, (UNCLASSIFIED)

2. Division 86 Automated Unit Reference Sheets (AURS), TRADOC (UNCLASSIFIED)

3. The Army Authorization Documents System (TAADS), ODCSOPS, 12 June 1981 (UNCLASSIFIED)

4. Force Accounting System, Active Army Troop List (Green Book), ODCSOPS, 31 March 1981 (CONFIDENTIAL)

5. Nie, Norman H. et al., Statistical Package for the Social Sciences, Second Edition, McGraw-Hill Book Company, New York, 1975, (UNCLASSIFIED)

BIBLIOGRAPHY

DEPARTMENT OF DEFENSE

Department of Defense Publications

Army Program Objective Memorandum (POM), FY 1983-1987, Washington, DC (SECRET)

AR 5-5, The Army Study System, 5 July 1977 (UNCLASSIFIED)

AR 310-49, The Army Authorization Document System (TAADS), 15 December 1980 (UNCLASSIFIED)

AR 600-200, Promotion to Pay Grades E-5 and E-6 (UNCLASSIFIED)

DA PAM 11-2, Research and Development Cost Guide for Army Materiel Systems, May 1976 (UNCLASSIFIED)

DA PAM 11-3, Investment Cost Guide for Army Materiel Systems, May 1976 (UNCLASSIFIED)

DA PAM 11-5, Standards for Presentation and Documentation of Life Cycle Cost Estimates for Army Materiel Systems, May 1976 (UNCLASSIFIED)

Office, Deputy Chief of Staff for Personnel

Report, Enlisted Strength, DCSPER Report 411, April 1981 (UNCLASSIFIED)

Report, FY 79 Enlisted Personnel Transition Matrix, DCSPER Report DMDC 9M4232, March 1979 (UNCLASSIFIED)

Report, Enlistment Quality, DAPC 190, March 1981 (UNCLASSIFIED)

Enlisted Force Master Plan, 1980 (UNCLASSIFIED)

Report, Accession Cohort Reporting System, April 1981 (UNCLASSIFIED)

Report, Continuation Rates (generated from DCSPER Report 411), May 1981 (UNCLASSIFIED)

Office, Comptroller of the Army

Army Force Planning Cost Handbook, October 1979 (UNCLASSIFIED)

US Army Concepts Analysis Agency

Automated Force and Materiel Cost Methodology Improvement Project (ACMIP), CAA-D-81-1, April 1981 (UNCLASSIFIED)

MISCELLANEOUS

Dixon, Wilfrid J. and Frank J. Massey, Jr, Introduction to Statistical Analysis, Third Edition, McGraw-Hill Book Company, San Francisco, 1969 (UNCLASSIFIED)

Report, First-Tour Attrition: Implications for Policy and Research, Advanced Research Resources Organization, Research Report 1246, 1980 (UNCLASSIFIED)

FONECON between MAJ D. Tye, DAPE-ZXB, and LTC D. Holdsworth, CSCA-RQP, Subject: Guidance for Presentation of Analysis to Study Sponsor, 4 September 1981 (UNCLASSIFIED)

FONECON between SGM Weber, DAPE-ZXB, and LTC D. Holdsworth, CSCA-RQP, Subject: Guidance on First-Termer OCONUS Tour Lengths to be Modeled, 8 September 1981 (UNCLASSIFIED)

APPENDIX D

CHIEF OF STAFF GUIDANCE

D-1. INTRODUCTION. The URSA Study interfaces with several other analytical initiatives promulgated by the Army Chief of Staff to maximize stability and reduce turbulence in the Army. These goals have culminated in the persuance of a new manning system based on unit rotation and homebasing concepts. The URSA Study addressed the steady state modeling of this new concept.

D-2. BACKGROUND. The CSA directed several initiatives designed to analyze and to correct specific components of the Army manning system. These initiatives include:

a. Project COHORT (cohesion, operational readiness, and training) to test the effectiveness of accessing, training, and introducing company sized units as entities into the operational forces (both CONUS and OCONUS).

b. The Regimental System Study to examine the enhancement of cohesion through the adoption of an American regimental system.

c. The Army Cohesion and Stability (ARCOST) Study which addressed numerous initiatives to reduce turbulence, improve stability, and enhance cohesion.

d. The Management of Change Study, Implementation of Change Study, and MTOE standardization programs aimed at reducing turbulence in the force structuring process.

e. The Army Personnel System Review conducted by The Inspector General to review and recommend to the CSA alternative personnel replacement systems.

f. The Unit Replacement System Analysis (URSA) Study conducted by USACAA to analyze the steady state implications of a unit replacement/rotation concept.

g. Personnel Replacement System Policy Analysis conducted by General Research Corporation to analyze personnel policies pertinent to a unit replacement/rotation concept.

D-3. ODCSPER MANNING TASK FORCE. An ODCSPER Manning Task Force was formed at DA to formulate, analyze, and develop a new manning concept. The duties of the task force included the alignment and integration of the individual CSA initiatives with the objectives and goals of the new manning concept. The focusing of the task force on these initiatives, many of which were near term, was the basis for ideas and policy

directives which modified the direction and scope of the ongoing URSA Study. However, the initial underlying foundation of URSA, i.e., the steady state analysis of the manning concept as outlined by the CSA, remained the same.

D-4. MANNING SYSTEM CONCEPTS. The basic concepts which define the new rotational manning system analyzed during the URSA Study are detailed below. These concepts include considerations provided by the manning task force.

a. Stablilize soldiers together in units and rotate these units from CONUS homebases to OCONUS areas and back.

b. Units and soldiers will be linked together through the bonds of regimental heritage, traditions, colors, and a CONUS homebase.

c. Maintain organizational stability and interchangeability of units.

d. Assignments into and out of regimental units will be restricted to fixed "assignment windows" synchronized with unit rotation schedules.

e. An individual replacement system will supplement the unit rotation/replacement system.

f. The unit rotation system will focus initially on the CONUS-OCONUS rotation of stabilized, trained combat arms units with the ultimate goal of rotating battalions.

g. Combat arms units (Infantry, Armor, and Artillery) in CONUS, standardized by MTOE and level of personnel fill, will be matched with like OCONUS units and rotated on a fixed schedule.

h. An essential element of the concept is homebasing regiments at CONUS installations to which units would return upon completion of OCONUS tours.

i. To the extent possible, the soldier will spend company/battalion level assignments in the regiment, either CONUS or OCONUS.

j. Career soldiers will alternate tours in extraregimental (ERA) TDA assignments as necessary.

APPENDIX E

STUDY ASSUMPTIONS

E-1. GENERAL. This appendix states the assumptions that were established for the study. Most of the assumptions were stated in the tasking directive (see Appendix B). However, many other assumptions were implied or documented which integrated the CSA direction and guidance for the Army's manning system.

E-2. TASKING DIRECTIVE ASSUMPTIONS

a. USAREC can recruit sufficient personnel for the military occupational specialties (MOS) required to support a unit replacement/rotation system.

b. Facilities will exist to support a unit replacement/rotation system.

c. Current promotion and attrition rates will apply.

d. Grade substitution (to next higher grade) will be permitted during unit predeployment and postdeployment fill periods.

e. Grade substitution (one up/one back) will be permitted during the stabilization periods to minimize turbulence.

f. The number of OCONUS units subject to replacement/rotation, by type TOE, will not exceed the number currently envisioned being stationed OCONUS under Army 86/Division 86.

g. Conversion to Army 86/Division 86 will not change the by-grade, MOS, or officer specialty end strenth of the Army.

h. Legislation will exist to allow variable enlistment periods. All first-term enlistment periods will be equal to 36 months plus the MOS-peculiar initial entry training (IET) period.

i. The Active Components of Army 86 will remain a total "volunteer" Army.

j. The by-grade and MOS authorizations for TDA positions, positions in TOE echelons above battalion (EAB), and positions in separate TOE units of smaller than battalion equivalent size will remain for the steady state as they are reflected in the Army Authorization Document System (TAADS)[3] as of 2 July 1981.

E-3. MANNING TASK FORCE CONCEPT PAPER[1] ASSUMPTIONS

a. Stabilization

(1) First-term soldiers will serve in a regimental unit for the full term of their enlistment.

(2) Units identified in the regimental system will be stabilized during their period in CONUS and OCONUS.

(3) The promotion of soldiers through grade E-8 will not be the sole reason for reassignment prior to completion of the stabilized tour.

(4) Soldiers who reenlist to fill their own vacancy will continue to be stabilized in their unit.

(5) Soldiers who serve in a regimental unit will not be reassigned prior to completing the stabilized tour unless they:

(a) Have an approved compassionate reassignment.

(b) Become disqualified to serve in or are relieved for cause from the assignment.

(c) Become surplus to the needs of the unit.

(6) Soldiers who by virtue of an intervening expiration of term of service (ETS) are not able to complete the prescribed OCONUS tour with the unit are required to either extend or reenlist in order to accompany the unit when it rotates from CONUS.

b. Unit Rotation System (URS)

(1) The Army will implement a unit rotation system.

(2) The URS will apply to MTOE units in the Army where feasible. Nonrotating units will be the exceptions.

(3) The URS will be supplemented by an individual replacement system.

(4) The URS will apply in peacetime, wartime, and during mobilization.

(5) The URS will be linked to the homebasing and regimental systems--units rotate to and from the same regimental homebase.

(6) Units will rotate only with like-type units (e.g., armor, light infantry) standardized by MTOE, personnel fill, and major weapons systems.

(7) For soldiers serving in the unit, the unit rotation schedule will determine overseas tour lengths, first-term enlistments, and related personnel assignment and professional development policies.

(8) There will be "fixed assignment windows" during which soldiers will join or leave the unit, synchronized with the rotation schedule. Exceptions will be closely controlled.

(9) Prior to rotation, deploying units will undergo a prescribed predeployment unit training program, oriented to their overseas destination.

(10) For CONUS, Europe, Alaska, and Panama, the unit tour length is 3 years. For Hawaii, it is 2 years and for Korea, 1 year.

(11) High density MOS first-term soldiers will join their regimental battalion as a group whether in CONUS or OCONUS, having just completed IET together. They will remain together in that unit, whether it rotates or not, and will separate or reenlist during an assignment window.

(12) To maintain a consistent level of combat capability overseas, the unit rotation system will group interchangeable battalions and develop a separate rotation pattern for each subset, based on current and projected locations of units worldwide. For example, Armor, Mechanized Infantry, Light Infantry, Field Artillery (155SP) and Field Artillery (8-in SP) are all separate rotation subsets.

c. Homebasing

(1) All units in the regimental system will have a CONUS homebase which will also be the permanent location of the regimental colors.

(2) The rotation patterns will return a unit to its CONUS homebase for a tour at the end of every OCONUS tour.

(3) If assigned outside the unit, every effort will be made to reassign the soldier to available TDA positions at his CONUS homebase for a CONUS tour and then back to a unit in his regiment at the end of his TDA tour.

E-4. REGIMENTAL PERSONNEL FLOW MODEL (RPFM) ASSUMPTIONS

a. The model reflects the essential elements which govern mobility through a regimental system.

b. Individuals, after arriving in an organization, should remain there for some minimum time period before being reassigned unless a unit of higher priority becomes critically short. After spending some maximum period of time in an assignment, an individual will normally be

considered for reassignment, based upon the needs of the system. In some assignments, such as Europe, this maximum time limit will be binding and the individual will move.

c. Shortages in units will be filled by personnel due for reassignment. Further shortages will be filled through forced reassignments based upon a priority system between units. Personnel being reassigned in the latter case will be those individuals of the appropriate grade and MOS who have the most time in their present assignments. Substitution back will be allowed during the stabilized periods for rotational units.

e. Whenever a unit experiences excess personnel in a specific grade-MOS area, after maximum grade substitution has been allowed, that excess number of personnel with the most time in the unit will be reassigned if vacancies exist in other units and the transfer is permissible.

f. Whenever the entire system is overstrength in a specific grade-MOS area, after maximum grade substitution has been allowed, the system will be brought back into balance by removing that quantity of excess individuals from the simulation. Removal will take place in the units overstrength in proportion to their overstrength condition. Individuals removed will be those with the most time in grade.

g. Unit strengths may vary between a maximum and a minimum value. The objective of the model will be to keep each unit at least to its minimum value. Units over their maximum value will be considered overfilled. Maximum and minimum values will be targeted at each grade and MOS combination. Maximum and minimum values may be varied over time to account for the unit's needs and status. Variance from the minimum through maximum strength level will trigger movement actions as allowed. The status or condition of other units in the system may preclude rectification of the violated condition.

h. To ensure the maximum availability of personnel during rotational unit fill and opt-out windows, movement other than critical shortage movement will not occur except when at least one rotational unit is filling or opting out.

i. The regiment, as described by the input parameters, essentially reflects the policies, procedures, conditions and limits which would be expected to exist during the steady state existence of a regimental system.

j. Grades E-1 through E-4 may be handled as an aggregate category over all MOSs.

k. A quarterly time step is sufficient resolution for modeling the rotational system.

l. Individuals will not be allowed to exit a rotational unit in Europe except for movement caused by overfill conditions.

m. Individuals in nonrotational unit assignments will not reenlist to leave that unit prior to the maximum stay time for that unit. This means there is no explicit probability of leaving.

E-5. STYLIZED REGIMENT ASSUMPTIONS

a. Maneuver battalions can be analyzed in terms of a small number of high density MOSs and the individuals in the low density MOSs would follow like patterns or be assigned individually.

b. Individuals are assigned only in their primary MOS.

c. Army-wide TDA and EAB personnel requirements do not change by grade. (Note: Prior to system modeling, some adjustment in MOS structure was made to ensure a balanced TDA and EAB structure for the regiment as a whole.)

d. The flows into and from the Individuals Account (trainees, transients, holdees, and students) are equal, and for a given type regiment are distributed in proportion to the Army-wide distribution.

e. The Army can man battalion level replacement units where the CONUS/OCONUS force ratio is out of balance in favor of the OCONUS units.

f. All rotating units of a given type are organized, staffed, and equipped identically.

E-6. RESOURCE ANALYSIS ASSUMPTIONS

a. Cost factors contained in the Army Force Planning Cost Handbook (AFPCH) and the Force Cost Information System (FCIS) will not change under a unit rotation concept except for loss rates and PCS costs.

b. PCS costs, by theater, for unit moves will not be greater than individual move costs as given in the FCIS.

c. PCS is defined as an intertheater move and, for CONUS only, an intratheater move.

d. Since a goal of the URSA I analysis was to man the rotation/replacement system at ALO 2, all unit costs will be based on the requirements of ALO 2.

e. The costs associated with unit equipment will not differ under individual replacement versus unit rotation/replacement.

APPENDIX F

POLICY REQUIREMENTS

F-1. GENERAL. This appendix states the major policy requirements that must be in effect prior to the institution of a replacement/rotational system similar to that under study. Some of these requirements can be satisfied by policy changes. Others, i.e., those already in force, must be preserved in a supportive manner.

F-2. RECRUITING. First-term enlistments must equal 36 months plus the MOS-peculiar initial entry training (IET) period.

F-3. ENLISTED DISTRIBUTION PLAN. Enlisted soldiers must be distributed to positions supported by their regiment. Intense management through a system similar to the officer distribution plan will be required.

F-4. ASSIGNMENT

a. The maximum tour length overseas for first-termers must be equal to 18 months.

b. The long-tour lengths must be equal for both accompanied or unaccompanied careerists.

c. Nondeployable personnel cannot be assigned to rotating/replacement battalions.

F-5. UTILIZATION

a. Commanders must not cross-level soldiers between battalions.

b. Enlisted soldiers must be assigned in their primary MOS.

F-6. SEPARATION. The expiration-of-time-in-service (ETS) date of careerists who are assigned to regimental units and who intend to separate from the service must be adjusted to an opt-out window.

F-7. FORCE STRUCTURE

a. All rotating regimental units must be organized and equipped identically.

b. Provisional replacement units must be formed to replace OCONUS units when the CONUS/OCONUS force ratio is out of balance in favor of the OCONUS units.

APPENDIX G

REGIMENTAL PERSONNEL FLOW MODEL

G-1. PURPOSE. This appendix provides a brief documentation of the Regimental Personnel Flow Model (RPFM). This model was developed specifically to support this study.

G-2. OVERVIEW. The RPFM is a high-resolution, discrete, time step computer simulation which models personnel as an inventory asset flowing through a regimentally based unit system. The model simulates a single regimental system during each run. Resolution is performed at the individual soldier level. The model recruits, promotes, reenlists, transfers and releases each individual. At each simulated time step, each individual's current status, location, unit, and selected accumulated history is recorded. Unit fill levels, personnel demand, and transfers are written at the end of each time step. Post processors examine the individual records to produce further individual, unit, and regimental statistics. The model can simulate various regimental organizations since the organization type is an input parameter.

G-3. ENVIRONMENT. Model software was written and tested on the UNIVAC 1100/82 computer. The program and all postprocessors were written in American Standard Code for Information Interchange (ASCII) FORTRAN, Level 9R1. The program uses the UNIVAC multibanking capability to accommodate a storage requirement of approximately 265K-400K words of core storage. Each simulated time step produces 27 words of mass storage per individual active in the system and 5-10 pages of hard copy output. A simulation of 1,500-1,600 personnel simulated over 42 years at quarterly intervals (168 time steps) produced 320,000 individual records (5,000 tracks of mass storage), 1,450 pages of hard copy print and took 5 CPU hours to run. A system of 2,500 personnel requires 20 CPU hours to run.

G-4. METHODOLOGY

a. Model Inputs. The following parameters are inputs to the model and describe the system being modeled.

(1) Parameters Governing Individual Careers

(a) Initial Enlistment Period - 3 years + Initial Entry Training (IET).

(b) Reenlistment Period - 3 years or as dictated by rotational unit option points.

(c) Amount of time required to be spent in a unit before an individual is considered to be fully trained - 1 month.

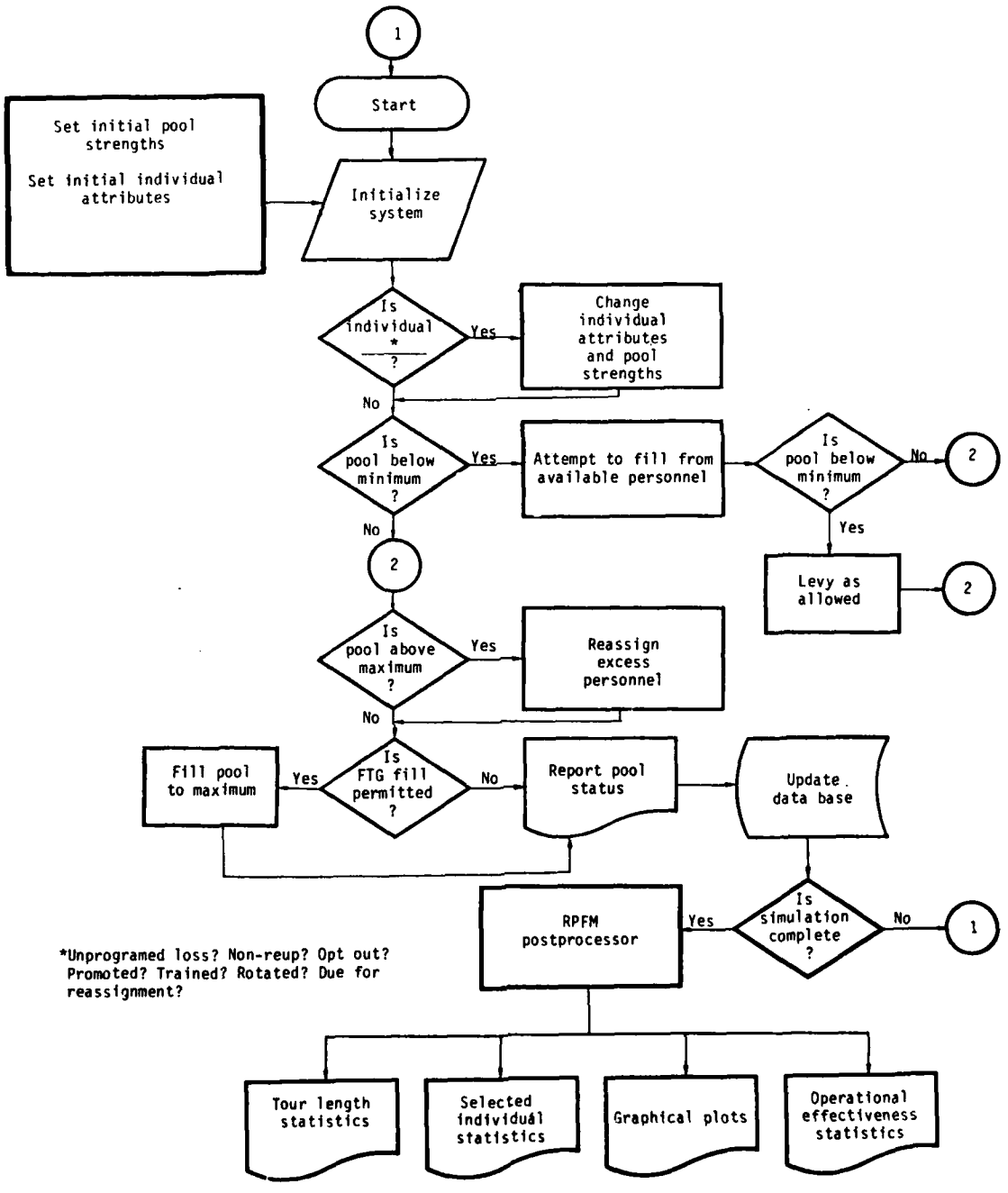


Figure G-1. RPFM Methodology

(d) The probability of promotion to the next higher grade given the current grade and the time in grade (TIG). (See Figures G-2 through G-6.)

(e) Qualitative management criteria

1. Minimum TIG for promotion to the next higher grade. (See Figure G-2 through G-6.)

2. The maximum TIG an individual may have before his existence in the simulation is terminated. (See Figures G-2 through G-6.)

3. The minimum time in service (TIS) for promotion to the next higher grade. (See Figure G-7).

4. The maximum TIS an individual may have before his existence in the simulation is terminated. (See Figure G-7.)

(f) The probability of unprogrammed loss based upon the time in service. (See Figure G-8).

(g) The probability of retirement at the 20-year mark based upon grade. (See Table G-1).

(h) The probability of retirement after the 20-year mark based upon grade. (See Table G-1).

(i) The probability of reenlisting based upon the individual's grade and MOS. (See Table G-1).

(j) The probability that an individual in a rotational unit will reenlist for a different unit.

(k) Maximum and minimum unit tour lengths by grade, MOS, and unit, including whether or not the maximum tour length is binding.

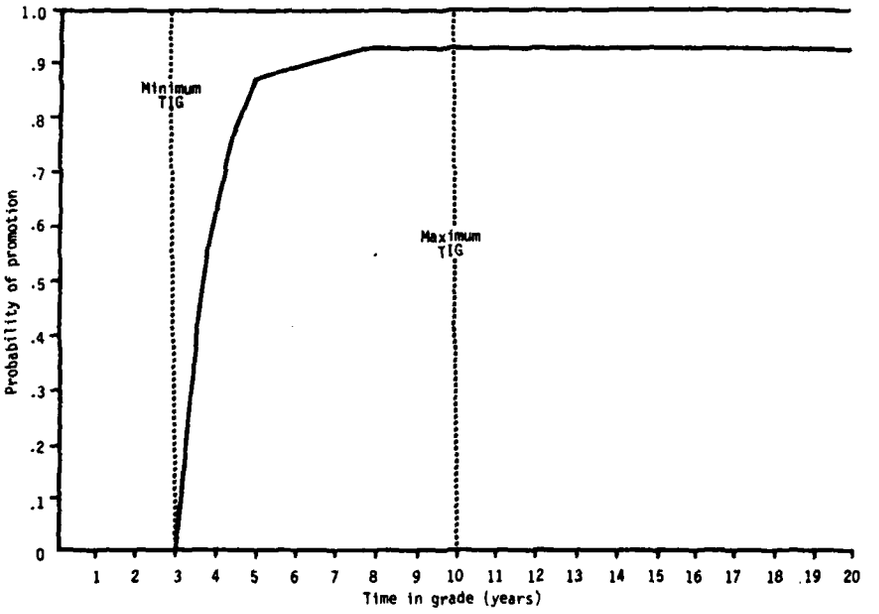


Figure G-2. Cumulative Probability of Promotion from E-1 through E-4 to E-5

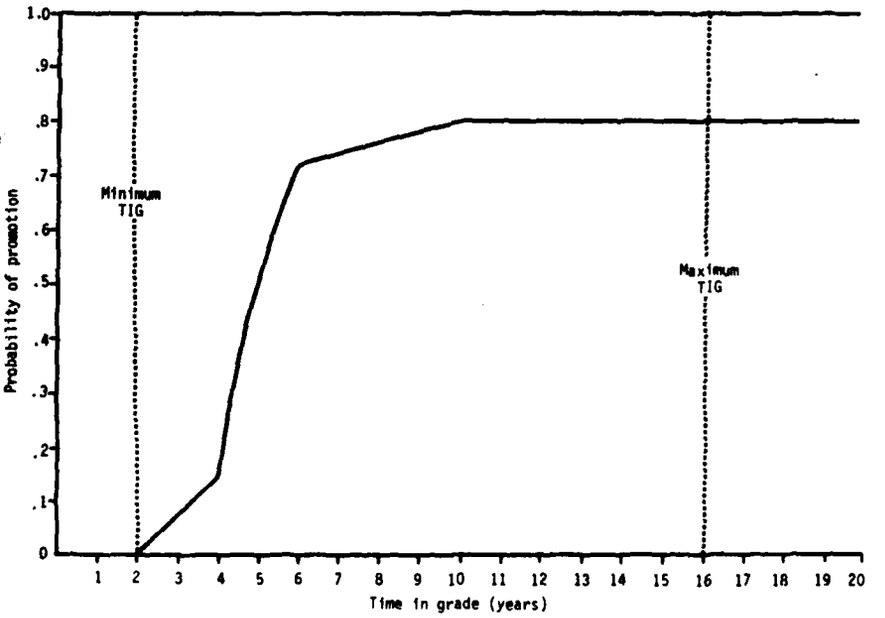


Figure G-3. Cumulative Probability of Promotion from E-5 to E-6

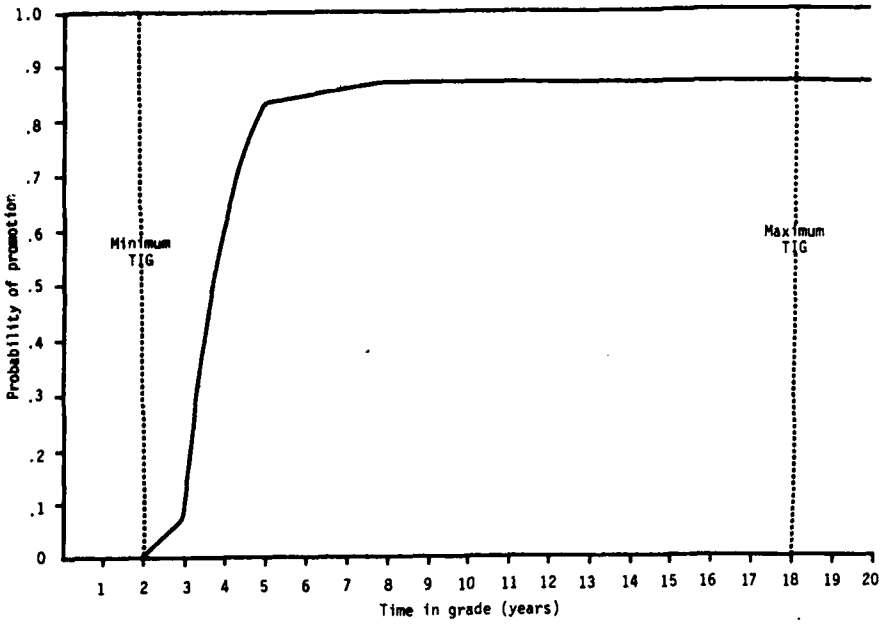


Figure G-4. Cumulative Probability of Promotion from E-6 to E-7

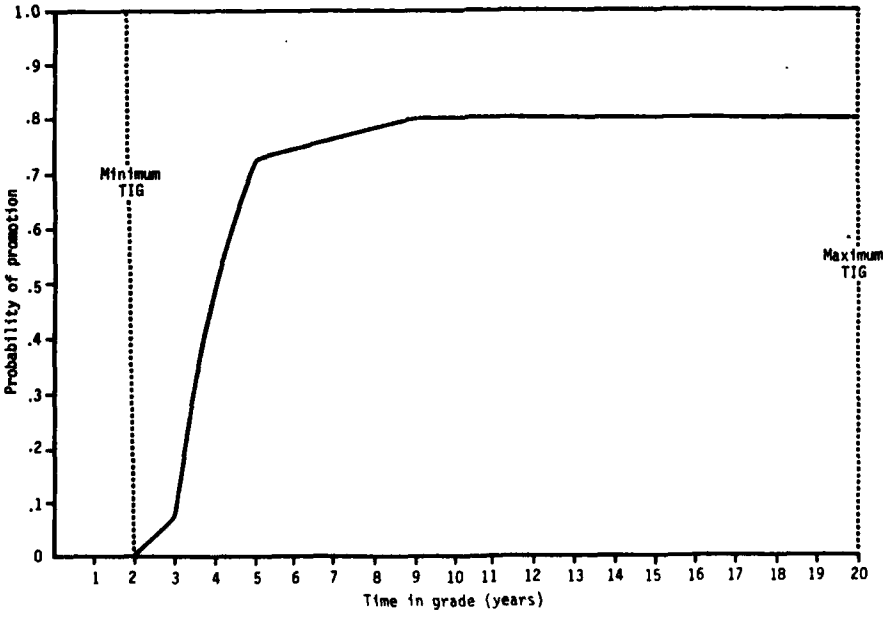


Figure G-5. Cumulative Probability of Promotion from E-7 to E-8

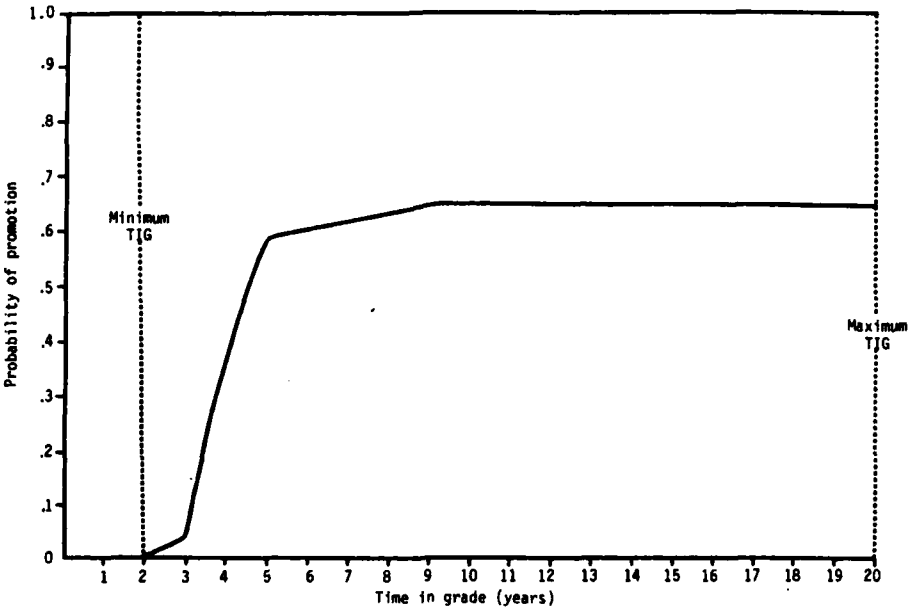
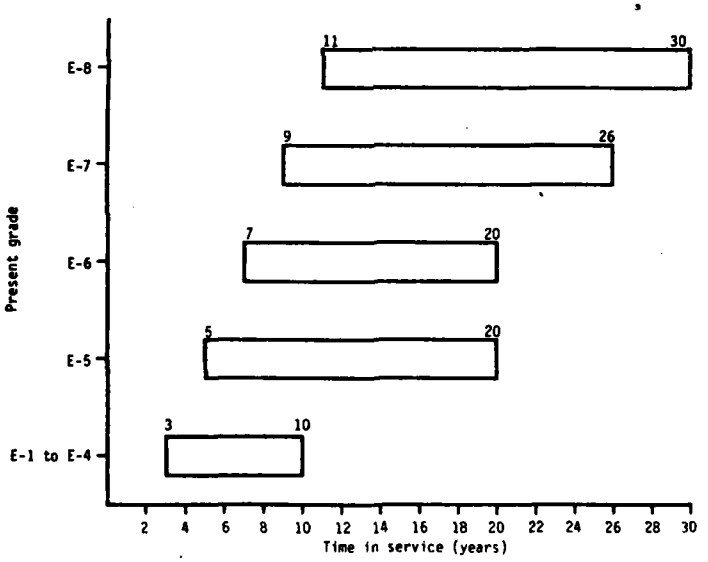


Figure G-6. Cumulative Probability of Promotion from E-8 to E-9



MINIMUM: Lowest time in service point at which an individual may be considered for promotion to the next higher grade.

MAXIMUM: Time in service point at which an individual is forced to leave the service.

Figure G-7. Minimum and Maximum Time in Service

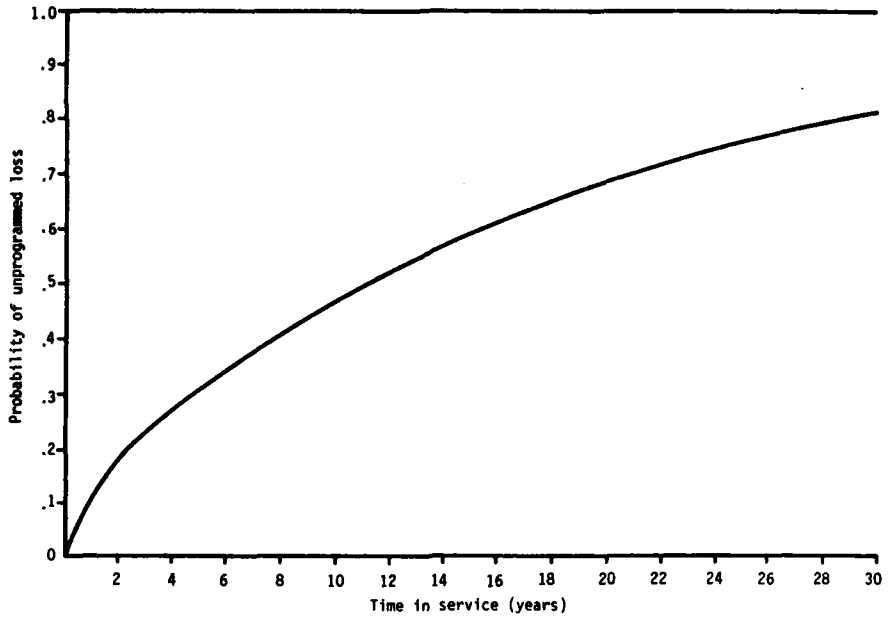


Figure G-8. Cumulative Probability of Unprogramed Loss

Table G-1. System Loss Probabilities

Grade	Reason for loss		
	Fail to reenlist	Retire at 20 years	Retire after 20 years
E-1 to E-4	.52	.99	.99
E-5	.50	.99	.99
E-6	.35	.99	.99
E-7	.05	.55	.54
E-8	.05	.12	.53

(2) Inputs Governing the Regiment Modeled

(a) The number of units to be simulated.

(b) A prioritized list of units to which a particular unit may transfer people.

(c) A prioritized list of units from which a particular unit may draw people to fill a critical shortage.

(d) A percentage of unit strength below which a unit may not be drawn to fill other units' critical shortages during any one time step.

(e) The time between first-term group (FTG) fill periods for a given unit.

(f) The percentage of first-termers who reenlist and remain in their present unit.

(g) The minimum time an individual must remain in a rotational unit before he can reenlist for a different unit.

(h) Movement among nonrotational units during time steps when all rotational units are stabilized.

(i) The minimum and maximum strengths of each unit by grade and MOS. These values may be changed at each time step.

(j) The location of each unit at the end of each time step.

(k) The status code for each unit for careerists and FTG at each time step.

(l) The type of unit qualifier for each unit at each time step.

(m) Data to support certain FTG fill methods (as required).

(n) Percent grade substitition allowed.

b. Processing

(1) Set Up. The main program reads and stores all inputs. Based upon the option selected, the main program will read the initial set of individual records or call upon a subroutine which will randomly generate a starting group of records. Once all initializing procedures are completed, the main program begins a discrete time step simulation of the input system.

(2) Individual Attributes. The first simulated act is to update the historical accumulators and defining attributes for each individual. Each time step event is considered the end of the time step simulated. Therefore, each individual is given credit for another increment of time spent in his current unit, current grade, time in service, time in theater and any other appropriate "time in" attribute. Following this, each record is checked to see if the individual has left the system at this time step as an unprogramed loss. The records of those individuals who remain are then evaluated for reenlistment/retirement and promotion. Individuals exceeding maximum time in service or maximum time in grade are released from the system. The records of FTG personnel who are in an 18-month regulated tour assignment are flagged for reassignment. Personnel who are in units which are rotated during this time step are placed in their new location. Individuals in replacement units which are being replaced during this time step are flagged for reassignment.

(3) Movement. Within the model, movement of personnel between units and/or locations is accomplished in four phases. The policies listed in the assumptions are modeled to form the constraints within which the system structure promotion and attritions cause the movement of individuals. Unit rotation is the first phase of movement. This simply changes the locations of individuals based upon the rotational schedule input to the model. This is accomplished as an individual action as stated above. The remaining three phases of movement involve movement between units. The second phase reassigns individuals who have exceeded their maximum stay time in the unit or are flagged for reassignment (normal reassignment). The third phase attempts to fill all units to their minimum strength level (emergency fill). The fourth phase attempts to balance the system by moving individuals who are excess to the maximum strengths of their units (excess strength conditions). The word attempt is used since movement is governed by the strength status of the system, movement priorities, and stabilization schedules. Each of the latter three phases will be explained below.

(4) Normal Reassignment

(a) Each individual is checked to determine the total time he has spent in his current assignment. If this time exceeds the maximum specified for his unit, grade, and MOS, he is placed in the replacement pool to be evaluated for possible reassignment. The following special cases and exceptions are also applied at this time:

- If the individual is presently assigned to a rotational unit which is stabilized, the individual is not placed in the replacement pool;
- Individuals in rotational units who were flagged for reassignment because they reenlisted to leave the unit are placed in the replacement pool;
- Individuals flagged for reassignment due to the 18-month criterion are placed in the replacement pool.

(b) Once the replacement pool is defined, any units managed under a unit replacement system and due for replacement action are considered. This consists of assigning all individuals presently in the replacement unit to other units based on the assignment priority system and the receiving unit's strength levels. The new unit is then formed from those personnel residing in the replacement pool. There are no transitions of personnel in the replaced unit to the replacing unit. Personnel remaining in the replacement pool are reassigned based opon the following criteria:

- A priority of transfer based on the individual's present unit and location and the prospective receiving unit and its location,

- The receiving unit's strength and its status with regard to receiving personnel.

(c) If an individual cannot be reassigned because of system restrictions and/or the system status, he is left in his current unit. When an individual is being routinely transferred, the needs of the proposed unit are considered both for the individual's current grade and one grade higher.

(5) Emergency Fill. Each unit in the regimental system has a target strength for each MOS/grade combination. If a unit's strength falls below this target, an emergency fill action may be triggered. In determining the need for an emergency fill, the unit is first cross-leveled using the grade substitution criteria. The grade substitution criteria allow all units to substitute for the next higher grade and further allows rotational units in a stabilized period to substitute for one grade lower. Based upon this criteria, each unit is examined for shortfalls. Units having shortages are filled with assets from other units based upon a priority system and a maximum percentage of strength value imposed upon the losing unit. This precludes units from supplying more personnel than their percentage limit for other unit's emergency needs. A unit would not fill another unit's emergency need if filling that need would cause the losing unit to fall below it's targeted strength level. Emergency fills are left unfilled when no personnel are available. If a unit is not authorized to draw from any other unit, it has no emergency fill capability. Stability conditions have no effect upon emergency fill determinations other than as previously stated.

(6) Excess Strength Conditions. Each unit also has a maximum strength limit by grade and MOS. Whenever a unit exceeds this maximum strength authorization, an attempt is made to move the excess personnel from the unit. Prior to any determination of excess conditions, grade substitution is performed in accordance with the aforementioned criteria to minimize any movement actions. The grade substitution performed here also protects those people who may be promoted in the near future by placing them in their future positions. Once grade substitution is performed, the entire system is checked for overstrength conditions. If the entire system is overstrength in any individual grade/MOS, personnel are removed from the simulation to bring the system back into balance. Those personnel removed are personnel with the most time in grade. Once the system is in balance, reassignment of excess personnel is attempted in overstrength units. Movement is based upon the same criteria as in normal reassignments. Personnel may be moved prior to spending the maximum allowed time in the unit, but those with less than the minimum amount of time will not be moved. If there is no available unit to which an excess individual can move, he will remain in his unit. The stabilized status of a unit will not stop excess personnel from leaving the unit but will prevent other units' excess personnel from entering that unit.

(7) FTG Fill. As the last simulated act in each time step, each unit is evaluated for its eligibility and need for FTG fill. Two basic methods of defining FTG fill requirements are used. The dynamic fill method is designed for stablized units which fill at specified time steps. The periodic fill method is designed for nonstablized units (rotational or nonrotational) which receive either a specified quantity of FTG fill or enough to reach their target strengths.

(a) Dynamic Fill. The dynamic fill method is based upon the fact that time steps between fill periods allow no movement of the FTG into or out of the unit. With this premise, the model fills the units with enough first-termers to ensure that the total number of FTG personnel at the beginning of the next fill period is equal to the minimum target strength.

(b) Periodic Fill. Nonstabilized units are filled to some target strength at periodic intervals. During these intervals, they are maintained at or above a lower target strength by adding additional FTG. First termers are allowed to move between major fill periods.

c. Outputs. The RPFM produces both hard copy and mass storage output. Outputs are generated for each simulated time step with some overall summaries produced.

(1) Mass Storage Output. At the end of each time step, the status/historical record of each individual who is active in, entered or departed the regimental system during that time step is written in a mass storage file called "Time-Sequenced Records," discussed in paragraph G-5 below. Each mass storage file used contains the records of individuals for a 40-time-step-interval. The simulation of 168 time steps produces five mass storage files.

(2) Hard Copy Output. Hard copy output is produced during initialization, at the end of each time step, and at the end of the simulation. The first information printed is an echo print of the input values which define the system. The starting strength levels of each unit are also printed. For each time step, the following items are printed:

(a) Unit location, unit type, careerist status, FTG status, TOE change, parent unit.

(b) Quantity of personnel moved due to emergency fill.

(c) Personnel moved under emergency fill who have less than the minimum required time in their current assignment.

(d) Total personnel eliminated because of system overstrength conditions.

(e) Overstrength conditions which could not be resolved.

(f) Total movements caused by excess overstrength conditions.

(g) Total personnel active in the system before and after FTG are added.

(h) Total FTG fill by MOS and unit.

(i) Unit strength summaries.

(j) Training status summary.

(k) Personnel transfer matrix.

(l) Total departures.

(m) Total personnel involved in unit rotations.

(n) Total FTG fill.

(3) The Summary Printout Includes:

(a) Unit strength summary for each unit, including mean strength, mean strength as a percent of maximum, and the standard deviation of the unit strength.

(b) Training statistics, including mean trained strength, standard deviation, and mean trained strength as a percentage of maximum.

(c) Composite transfer matrix.

(d) Total personnel entering and leaving the system.

(e) Total FTG fill added to the system by MOS and unit.

G-5. POSTPROCESSORS. Due to the large storage requirement of the model, the long run time required to execute the model, and the requirement for additional data created by increased knowledge of system interactions, other outputs or results are attained through the use of postprocessor programs. These postprocessors enable the analysis of an individual's personal history beyond that allowed by his historical accumulators. A single mass storage file is created which contains all the personnel records sequenced by individual and time step. This allows identification of specific individual sub-populations, such as those who had 20 or more years in the system, and the gathering of statistics from such a sub-population. This file is called "Individual-Sequenced Records."

a. Statistics Gathered from Time-Sequenced Records. "Time-Sequenced Records" are used to develop time step oriented statistics. These include:

(1) Graphical plots of strength over time by grade, unit, and each unit and the system as a whole.

(2) Graphical plots of unit strength over time.

(3) Graphical plots by unit of the quantity of personnel with 18 or more consecutive months.

(4) Turnover rates for each unit.

(5) Operational effectiveness rating for each unit of interest based on the balances, shortfall, and overage in each by grade, MOS, and training status at the end of each time step. This provides the percent of total time the unit meets minimum trained personnel requirments.

b. Statistics Gathered from Individual-Sequenced Records. The statistics gathered from "Individual-Sequenced Records" require a comparison between two or more records belonging to the same individual at different time steps. These statistics include:

(1) The distribution of the quantity of PCS experienced by individuals with 20 or more years of service.

(2) The tour length distribution by unit, excluding non-reenlisting FTG.

(3) The distribution of total time spent at the homebase during a career of 20 years or more.

(4) Expanded personnel transfer matrix broken down by: unit departed, unit receiving, grade, and the point in the current tour at which the individual departed.

G-6. LIMITATIONS. The RPFM, in its present form, is capable of modeling a rotational concept at the battalion level. A rotational concept, as stated here, means rotational actions with or without complementary replacement actions and includes rotational units with infinite cycle times which are, in effect, nonrotational units. The RPFM is limited to a regimental system with one homebase. Four theaters can be represented in any one simulation run.

G-7. DOCUMENTATION. The RPFM will be documented by contract and monitored as an ancillary task under the URSA II Study being conducted by CAA.

APPENDIX H

REGIMENTAL STATISTICAL ANALYSIS MODEL (RSAM)

H-1. PURPOSE. This appendix provides a brief documentation of the Regimental Statistical Analysis Model (RSAM) developed and used for the URSA I Study.

H-2. OVERVIEW. The RSAM is designed to provide a responsive post-processor capability to analyze the data generated by the Regimental Personnel Flow Model (RPFM). The model accomplishes this through the use of a system of commercially available statistical programs called the Statistical Package for the Social Sciences (SPSS)[5].

H-3. ENVIRONMENT. The SPSS is resident on a UNIVAC 1100/82 computer. The additional software necessary to enter and process data from the Regimental Personnel Flow Model (RPFM) was written by the study team.

H-4. METHODOLOGY. Figure H-1 presents an overview of the input, processing, and outputs of the RSAM. A brief discussion of each of these components follows the figure.

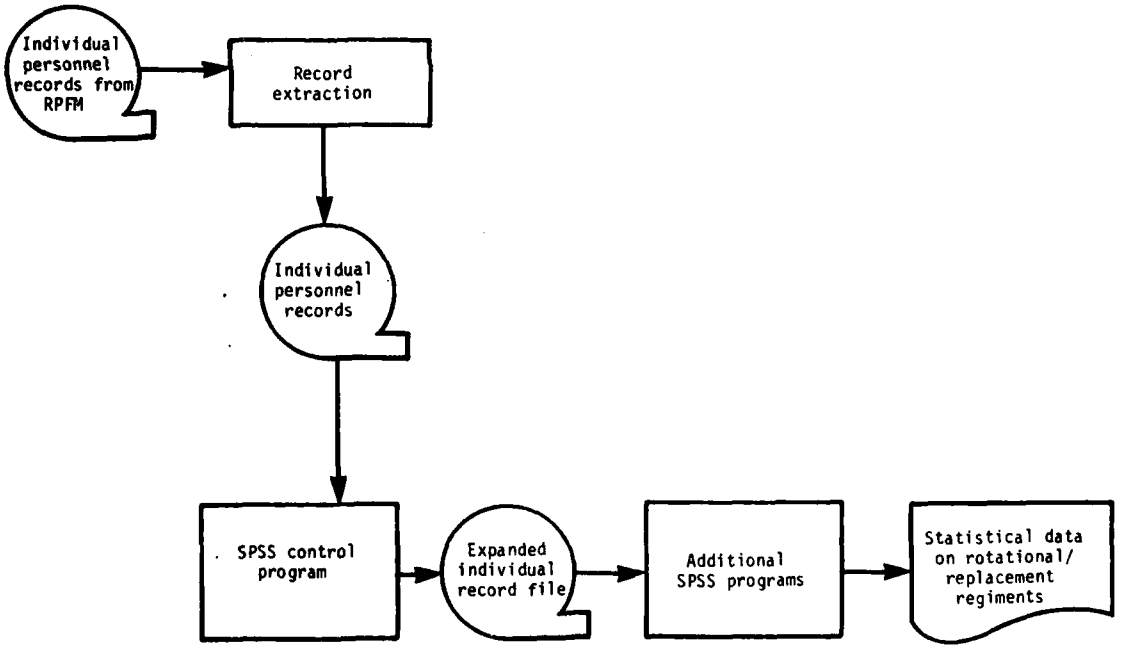


Figure H-1. RSAM Overview

a. Inputs. The inputs to RSAM consist of the individual personnel records, generated by the RPFM, each of which contain 27 associated personnel attributes such as individual identification, time in service, time in grade, and so on.

b. Processing. As indicated in Figure H-1, there are three basic processing steps in the RSAM methodology.

(1) Record Extraction. This part of the methodology is a program designed to select individual personnel records with specific attributes for further analysis using SPSS. As an example, for the URSA I analysis the last record created on each individual before he left the regiment/system was selected for further analysis. A revised individual personnel record file for the selected attributes is created by the record extraction program. Table H-1 shows the resource requirements of the record extractor.

Table H-1. Resources Required by RSAM

Elements	Core required (words)	Response time[a] (hour:min)
Extractor program	74K	1:30
SPSS control program	124K	1:30
Additional SPSS programs	124K	0:20

[a]Response time based on MX regiment runs.

(2) SPSS Control Program. This program governs the execution of the SPSS. It controls the reading and processing of data to produce the statistical output required by the analyst. For a specific overview of SPSS, its capabilities, and its operation, consult Statistical Package for the Social Sciences[5]. When applied to RPFM data, the SPSS control program provided analysis of the original 27 attributes on each individual record; defined an additional 50+ variables for each record; provided statistics on 26 variables of interest; and created an expanded individual personnel record file for subsequent analysis. Table H-1 shows the performance characteristics of the SPSS control program.

(3) Additional SPSS Programs. These special purpose programs are used to define and extract specific data (e.g., number of PCS) and statistics from the expanded individual record file.

c. Outputs. Outputs of the RSAM consist of numerous statistical analyses such as two-way and three-way contingency table breakdowns (e.g., current tour by previous tours), frequency distributions of selected variables, selected statistics (such as mean and standard deviation), and the expanded individual records file for each regiment.

H-5. LIMITATIONS. The limitations of the RSAM are those of SPSS, for example, the definition of no more than 500 variables. For specific information on the limitations of SPSS, refer to Statistical Package for the Social Sciences[5].

APPENDIX I

FORCE COST (FORCOST) MODEL SUMMARY

I-1. PURPOSE. This appendix provides a brief documentation for the Force Cost (FORCOST) Model (an automated resource analysis model) which was developed under the Automated Force and Materiel Cost Methodology Project (ACMIP). ACMIP was a project sponsored by the US Army Concepts Analysis Agency to improve the Army's resource analysis capability. Appendix L, Resource Analysis, provides the documentation on the use of the FORCOST Model in supporting the URSA 1 analysis.

I-2. OVERVIEW. The FORCOST Model was designed to provide force cost estimates for standard requirement code (SRC) units and life cycle cost estimates for materiel systems or system mixes. It accomplishes this through detailed cost estimates at the MOS and equipment level of detail and requisite aggregation of the detailed estimates to the system or force unit level. These costs are compared by an integrated system of programs that manipulate several large data files and apply the costing methodologies prescribed by the Force Cost Information System (FCIS) and DA costing guides. Capabilities and improvements that result from use of the FORCOST Model include:

(1) Automated life cycle costing capability.

(2) Automated capability to replace the previous force costing process which required many manual operations or a card deck request to US Army Management System Support Agency (USAMSSA).

(3) Increased accuracy for and timely response to resource analyses.

I-3. ENVIRONMENT. Model software was written and tested predominantly on the UNIVAC 1108 computer. Most programs were written in American Standard Code for Information Interchange (ASCII) FORTRAN, level 8R1.

I-4. METHODOLOGY. Figure I-1 presents an overview of the inputs, processing, and outputs of FORCOST. A brief discussion of each of these components follows.

a. Inputs. Inputs to the FORCOST Model consist of those provided by the user and those provided by the FCIS. User input data set(s) define the type of costing requirement in terms of people and equipment. In addition, a user file provides source data on any developmental equipment or new MOS that is to be costed. Inputs from the FCIS include cost data for most standard equipment line items, military training cost data, general factors that are related to both MOS and equipment costing, and existing SRC cost data.

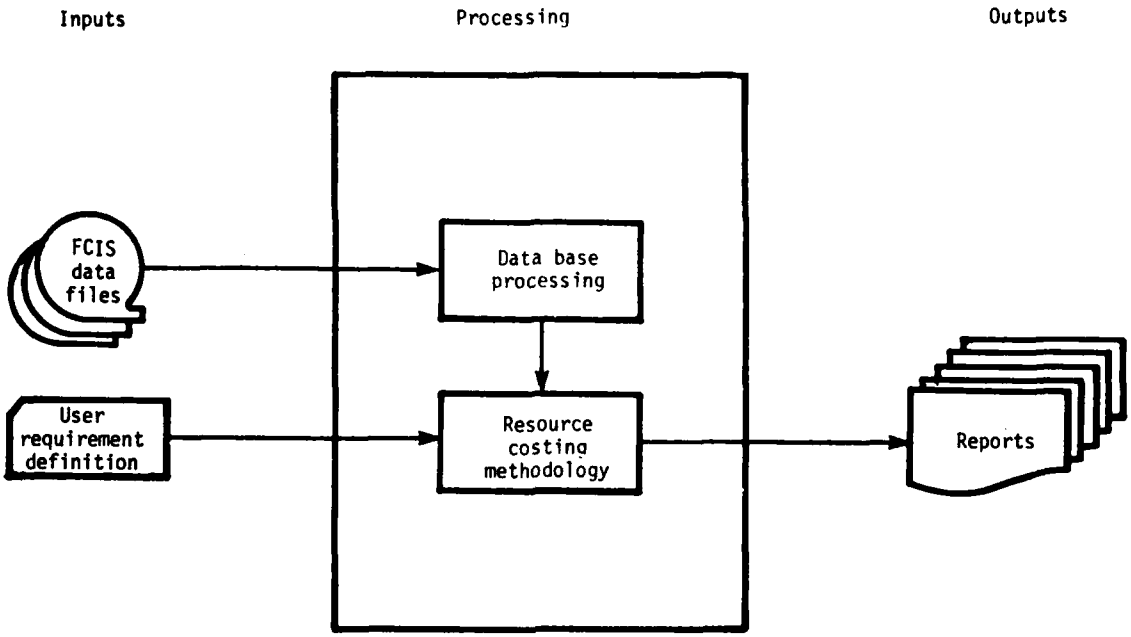


Figure I-1. FORCOST Methodology Overview

b. Processing. As indicated in Figure I-1, there are two basic types of processing provided by the FORCOST methodology.

(1) Data Base. This part of the methodology is transparent to the casual user of the FORCOST Model. It relates to the creation and update of efficient storage to contain the large FCIS data base. The methodology provides computer programs that convert the tapes of the LIN File, the Training File, and the SRC Cost File to direct-access disc files. Updates to these files and the Factor File (a three-page printout) correspond to the FCIS update cycle and are performed by the analyst responsible for maintaining the cost model. A Log Report informs the user of the latest update activity on these files. This report is included at the end of each cost input, and it gives the date of the last update to all data files used in generating the cost output.

(2) Resource Costing Methodology. The processing that is associated with resource costing incorporates the costing methodologies that are prescribed in the Army Force Planning Cost Handbook (AFPCH), AR 11-18 (The Cost Analysis Program), and DA Pamphlets 11-2 through 11-5. The AFPCH is a published by-product of the FCIS. The computer model which implements the costing methodologies is discussed in paragraph I-4.

c. Outputs. Outputs of the methodology consist of reports of system life cycle cost estimates (static and time-phased) and force cost estimates for new, modernized, or existing SRC units. Optional summary or individual cost reports are also available for personnel and equipment that are allocated to a force unit.

I-4. RESOURCE COST MODEL. The resource cost model is a network of integrated computer routines that access common support modules and input data. Figure I-2 illustrates how the routines are interrelated via their dependence on common inputs and the types of outputs that are produced. Because of this interrelationship, the cost model can be described as a collection of five basic modules. The major functions of each of the five modules are as follows:

a. Equipment Cost Module. Computes detailed cost estimates for equipment line items (LIN) maintaining cost visibility by major procurement appropriations, deployment theaters, and recurring versus nonrecurring investment and operations expenses. The module retrieves input data from optional sources depending on the type LIN that is to be costed. Developmental equipment (ZLIN) costs are based on a user equipment file, while standard equipment costs are based on the FCIS LIN file. Outputs that may be obtained from this module include:

(1) Detailed report of LIN cost estimate (extended by quantity).

(2) Identification of the factors used in the estimate and their source (user or LIN file).

(3) Date of the last update activity on equipment-related files.

b. Personnel (MOS) Cost Module. Computes detailed cost estimates for military personnel maintaining the same cost visibility as the equipment cost module. This module retrieves FCIS inputs that are needed to cost an MOS and writes a detailed cost report for the MOS if required. The module also provides the latest update activity on personnel-related files.

c. SRC Cost Module. Retrieves cost record of an existing SRC and writes a detailed report of the record if required.

d. Force Cost Module. This module provides the integration and accumulation of outputs from the equipment, personnel, and SRC cost modules that are required to develop costs for a new SRC or a modernized SRC.

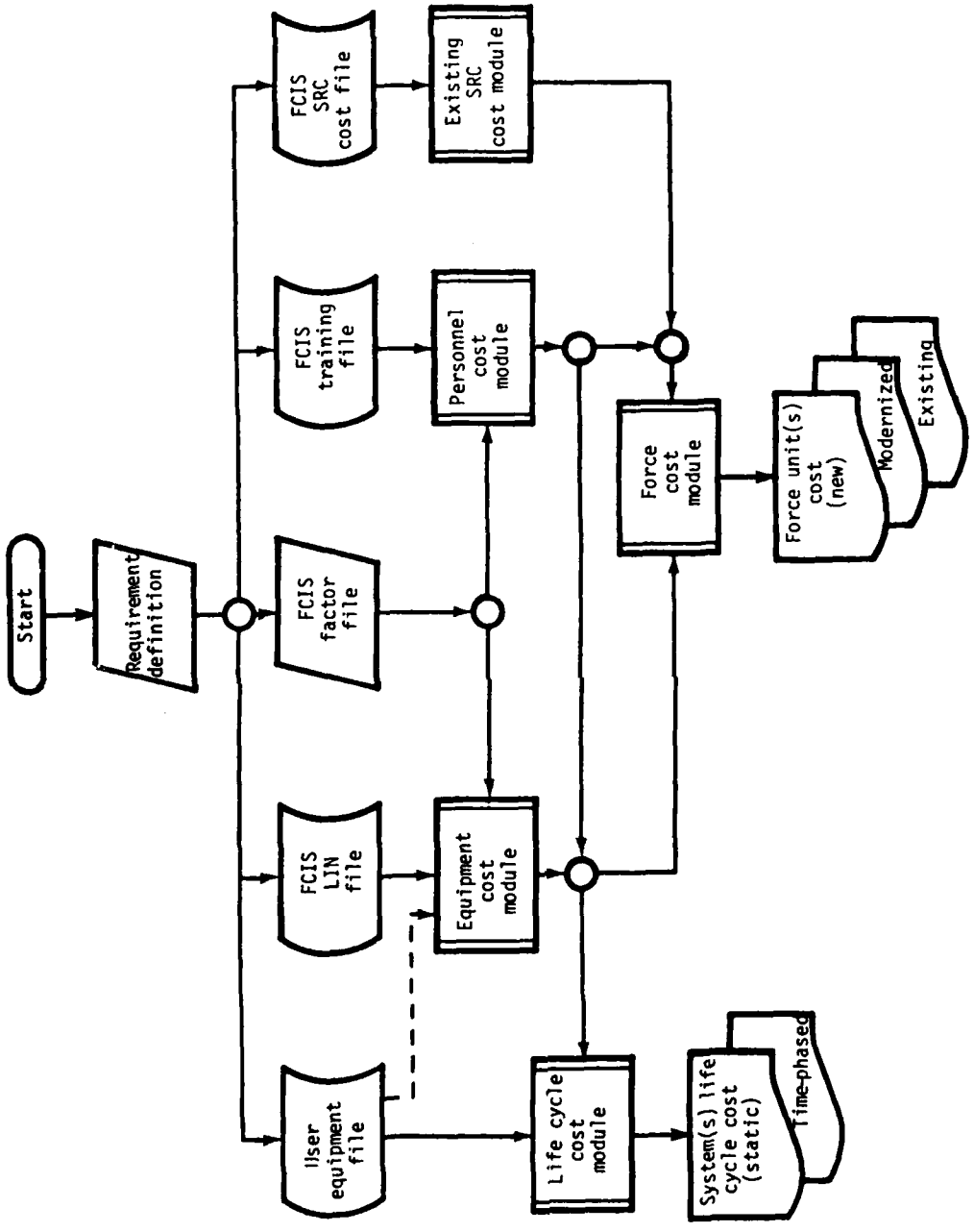


Figure I-2. Resource Costing Methodology

e. Life Cycle Cost Module. This module estimates the life cycle cost of materiel systems or mixes of systems by aggregating developmental equipment cost data and FCIS personnel/support equipment cost estimates, as necessary. The module's capabilities include the ability to produce life cycle estimates for any specified length of system life and the ability to develop cost changes based on procurement quantities through the use of learning curves and regression techniques. Per unit investment cost, a model output, can be an input to the force cost development process.

I-6. LIMITATIONS. FORCOST costing methodology is limited to prescribed methodologies of applicable Army regulations/procedures as indicated in para I-4b(2), above. The AFPCH documents the methodology for unit force costing. Life cycle cost methodology is described in DA Pamphlets 11-2 through 11-5.

APPENDIX J

PERSONNEL EVALUATION MODEL (PERSEM) SUMMARY

J-1. PURPOSE. This appendix provides a brief documentation for the Personnel Evaluation Model (PERSEM).

J-2. OVERVIEW. The model deterministically calculates population distributions by grade and time given attrition rates, promotion rates, and FTG fill rates. Input and output data can be in terms of annual or quarterly time steps. Model capabilities include:

a. The 30-year distribution of promotions and attrition of a cohort group, i.e., one whose personnel enter the simulation at the same time step.

b. Steady state distribution of promotions and attrition using individual replacement (a constant number of recruits enter each time step).

c. Steady state distribution of promotions and attrition using block fill (a constant number of recruits enter every nth time period).

J-3. ENVIRONMENT. Model software was written and validated on the UNIVAC 1100/82 computer. The program was written in American Standard Code for Information Interchange (ASCII) FORTRAN, level 9R1.

J-4. METHODOLOGY. Figure J-1 presents an overview of the inputs, processing, and outputs of PERSEM. A summary of each follows.

a. Inputs

(1) Unprogramed loss rate (death, incarceration, unexpected personnel actions, etc.)--loss rate is dependent on an individual's time in service (TIS) and grade.

(2) Separation rate (non-reenlistment)--loss rate is TIS and grade dependent.

(3) Retirement rate--loss rate is TIS and grade dependent.

(4) Promotion rate--rate is time in grade (TIG) and grade dependent.

(5) FTG fill--input includes the number of replacements and the frequency of fill.

(6) Initialization date--input includes the initial population by grade and the number of time steps to be examined. Time steps are either annual or quarterly.

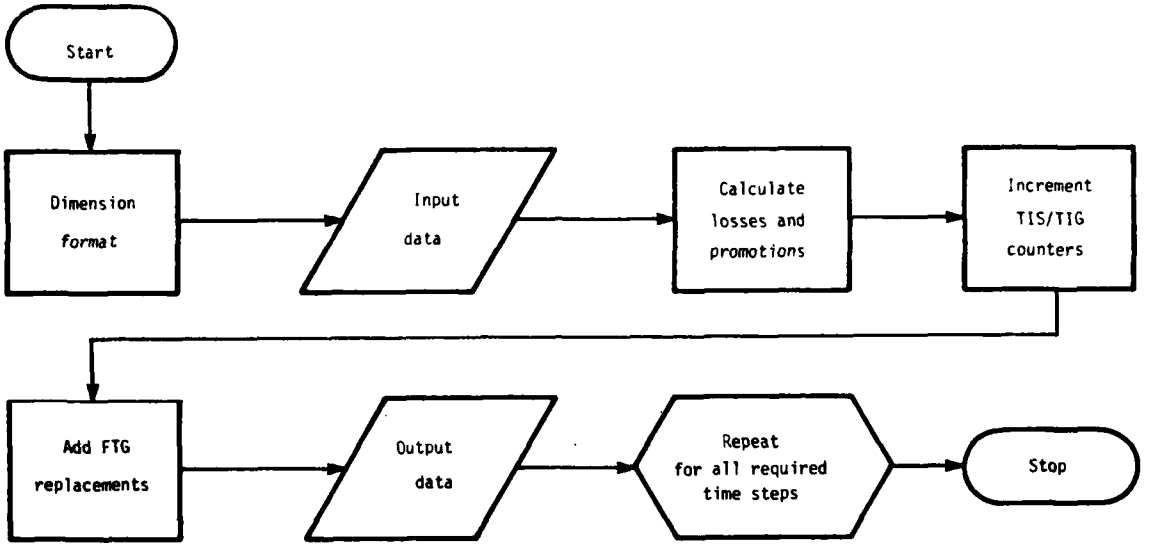


Figure J-1. Personnel Evaluation Model Methodology

b. Processing. Individuals are aggregated according to TIS, TIG, and grade. Each population group is then reduced by the appropriate unprogramed loss rate, separation rate, retirement rate, and promotion rate (in that order). Newly promoted populations are added to the appropriate groups and the TIS and TIG for all groups incremented by one time step. Recruit replacements are added, output data are collected, and the process is repeated for the number of desired time steps.

c. Output. Two output files are maintained. The first is a listing of the input date and a table summarizing the population distributions by grade for each time step. The second table lists the losses by type of loss and promotions for each grade at each time step.

J-5. LIMITATIONS. The model is a deterministic, inventory type model capable of producing population distributions based on attrition rates and promotion rates.

APPENDIX K

DATA SUMMARY

K-1. INTRODUCTION. During the simulation and the subsequent analysis of the unit rotation concept, a substantial amount of computer generated data was produced for each regimental stylization. It is neither possible nor appropriate to furnish that entire mass of data with this report. Chapter 5 in the main body of the report provides a representative sample of the data generated for the MX regiment. This appendix is intended to provide a descriptive list of the type of data generated for each type regimental stylization. The actual data has been provided to the Manning Task Force.

K-2. DATA CATEGORIES. The following list identifies the various categories of data generated for the analysis of each regiment type and provides a brief description of the data in each category:

a. Stylized Population Summary--a breakdown of the total regimental population by rotating and ERA pools. The data for each pool includes: numerical designation, type identification, personnel strengths (ALO 1 and ALO 3) by grade and MOS, and total strength. The data also includes regimental strength totals.

b. Pool Rotational Cycle Status Chart--a diagram showing the pool type for each pool in the regiment and, by the time step of the rotational cycle: the location of each pool and both the recruit and careerist personnel movement options in effect. This diagram is useful for determining and comparing the movement actions of various pools at different points in the rotational cycle.

c. Regiment Personnel Flow Diagram--a graphic representation of the movement of personnel to and from pools or groups of pools in the regiment. This visual presentation of the computer generated inter-pool transfer data displays the general patterns of movement within the regiment.

d. Total System Fill Graph--a graph showing the variation in the total number of personnel in the regiment during the 12-year steady state portion of the simulation. The total strength at each time step is plotted as a ratio of the modeled strength to the ALO 1 strength.

e. System Percent Fill by Grade (Without Grade Substitution)--one graph for each of the grade groups (i.e., E-1 to E-4, E-5, E-6, E-7, and E-8) showing the strength variation over time for the total regiment. Strength by grade is plotted as a ratio of the modeled strength to the ALO 1 strength.

f. System Percent Fill by Grade (With Grade Substitution)--one graph for each grade group as in K-2e, above. However, in this case the strength is presented by the grade at which the individual is actually being utilized.

g. E-1 to E-4 Fill by Pool--one graph for each pool plotting the E-1 to E-4 strength variation. The data shows both the FTG portion of the actual strength and the total (i.e., sum of FTG and careerist E-1 to E-4). The pool ALO 1 and 3 levels are also shown for reference purposes.

h. Pool Percent Fill by Grade (Without Grade Substitution)--one graph for each grade in each pool, showing the strength variation in the given pool. These graphs provide data similar to that in K-2e, but segregated by pool.

i. Pool Percent Fill by Grade (With Grade Substitution)--one graph for each grade in each pool as in K-2h, above, showing the strength fluctuation after grade substitution is allowed. These graphs provide data similar to that in K-2f, but segregated by pool.

j. Pool Stability (E-5 to E-8) --one graph for each pool in the regiment by time step showing what portion of the assigned E-5 to E-8 strength has been assigned to that pool for 18 or more months. The data is plotted as a percent of the total E-5 to E-8 authorization, with a separate line showing the average strength for the 12-year steady state simulation.

k. Pool Stability (E-1 to E-4)--one graph for each pool in the regiment as in K-2j, above, showing the E-1 to E-4 total strengths for the respective pools.

l. Career Statistics Package--a set of tables providing statistical data on career parameters as requested by the Manning Task Force. One table is provided for each separate statistic category and the values are given by grade. The values provided are the statistic mean value, its standard deviation, the minimum and maximum values observed, and the number of observations made in determining the statistic. The statistic categories requested by and furnished to the Manning Task Force are provided below:

- Number of rotational tours
- Number of homebase tours
- Number of short tours
- Percent of time spent at the homebase
- Percent of time spent in the unit

- Percent of time spent in CONUS
- Percent of time spent OCONUS
- Average rotational unit tour length
- Average homebase tour length
- Average CONUS tour length
- Average OCONUS tour length
- Number of CONUS tours
- Number of OCONUS tours
- Time spent in ERA assignments
- Total time spent in the service
- Total time spent in units
- Total time spent at the homebase
- Total time spent in CONUS
- Total time spent OCONUS
- Probability of return to the homebase

APPENDIX L

RESOURCE ANALYSIS

L-1. INTRODUCTION. This appendix documents the methodology and results of the cost analysis conducted for URSA I.

L-2. PURPOSE. The resource analysis was conducted to identify major dollar implications associated with the steady state rotation/replacement concept.

L-3. ASSUMPTIONS

a. Cost factors contained in the Army Force Planning Cost Handbook (AFPCH) and the Force Cost Information System (FCIS) will not change under a unit rotation concept except for loss rates and PCS costs.

b. PCS costs, by theater, for unit moves will not be greater than individual move costs as given in the FCIS.

c. PCS is defined as an intertheater move and, for CONUS only, an intratheater move.

d. Since a goal of the URSA I analysis was to man the rotation/replacement system at ALO Level 2, all unit costs will be based on the requirements of ALO 2.

e. The costs associated with the unit equipment will not differ under individual replacement versus unit rotation/replacement.

L-4. METHODOLOGY

a. Overview. A flowchart of the methodology used to develop the cost associated with each type of stylized regiment is shown in Figure L-1.

b. Data Sources. Data required to generate the cost of each stylized regiment came from a variety of sources, as listed below:

(1) Personnel Fill Data. Information on the average population in the regiment over time, by grade and MOS, was manually extracted from the results of the Regimental Personnel Flow Model (RPFM) (see Appendix G.)

(2) Recruit Requirements Data. Information on the total number of FTG required to support the regiment over time was also extracted from RPFM results.

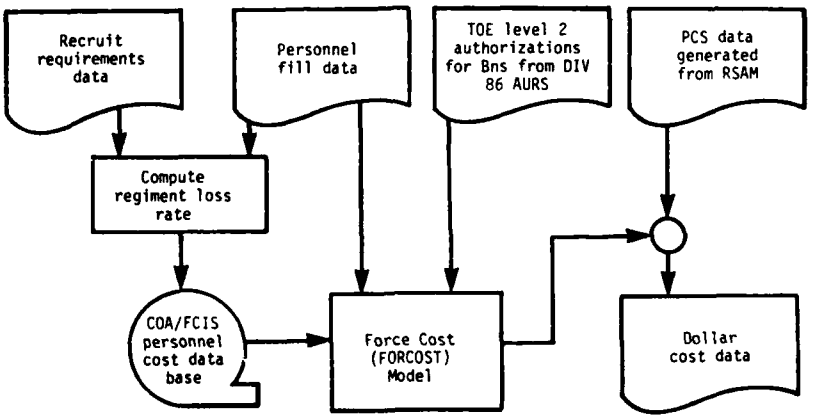


Figure L-1. Cost Methodology

(3) PCS Data. Information on the number of PCS from one component of the regiment to another, the number of personnel participating in a unit rotation, and the number of personnel entering and exiting the regiment for each geographical location (CONUS, Europe, Korea, etc.) was generated using the Regimental Statistical Analysis Model (RSAM). (See Appendix H.)

(4) COA/FCIS Personnel Cost Data. All other data necessary to determine the cost of a stylized regiment existed in the FORCOST Model data base. This cost data included personnel cost data such as the per soldier pay and allowances (by grade) and training costs by MOS. All costs in the FORCOST data base were in FY 81 constant dollars.

c. Methodology in Detail. A narrative description of the cost methodology, using the mechanized infantry (MX) regiment as an example, is presented in the following paragraphs:

(1) The average population, by MOS and grade, for each pool of the MX regiment was extracted from RPFM output. The population data was then aggregated to form two groups--the average personnel fill, by location, for the two MX battalions only and the average personnel fill for the entire regiment which also includes the ERA pools. These populations are shown in Table L-1.

(2) To provide a comparison with the average populations derived from the RPFM, the ALO 2 authorizations (by grade and MOS) for the two battalions were taken from the MX Division 86 (Div 86) Automated Unit Reference Sheets[2] (AURS). These authorizations are shown in the right column of Table L-1. A comparison of the populations of the two MX battalions from RPFM and at ALO 2 indicates that the manning associated with the policies of rotation/replacement is 7 percent higher than with the current individual replacement (1,167 vs 1,090).

Table L-1. Average Populations by Location[a]

MOS	Grade	2 MX bns		MX regt				ALO 2[b]
		CONUS	EUR	CONUS	EUR	KOR	PA	
11B	E-3	81	83	102	92	9	0	148
	E-4	233	235	293	262	24	0	414
	E-5	92	91	190	112	8	0	184
	E-6	42	43	102	52	6	1	96
	E-7	15	15	49	22	4	1	30
	E-8	8	8	34	13	2	1	16
11C	E-3	14	14	35	29	3	0	32
	E-4	16	15	37	32	4	0	28
	E-5	11	11	39	23	2	0	20
	E-6	2	3	17	7	0	0	4
	E-7	1	1	4	3	0	0	2
11H	E-3	18	17	24	19	2	0	30
	E-4	34	31	46	34	5	0	56
	E-5	8	9	36	11	1	0	12
	E-6	6	6	22	7	1	0	12
	E-7	2	2	7	3	0	0	6
	Total	583	584	1,037	721	71	3	1,090

Total regiment population = 1,832

[a]Locations are: CONUS, Europe (EUR), Korea (KOR), Panama (PA)

[b]Authorization for two (2) MX battalion in grade and MOS indicated.

(3) One of the factors used in computing unit cost data in the FORCOST Model is the annual loss rate factor defined as the number of FTG required per year to maintain the force divided by the size of the force. This factor is used to determine annual recurring training costs for the unit. Because of various policy changes anticipated from conversion to a regimental rotation system (i.e., stability periods, FTG block fills, etc.), the loss rate currently in the FCIS/FORCOST data base could not be used. That loss rate reflects the policies of an individual replacement system. Therefore, a new loss rate had to be calculated for each regiment costed. Since the RPFM assumes all FTG successfully complete Initial Entry Training (IET), and since the loss rate for FORCOST is calculated using the total FTG requirement (including IET

dropouts), the FTG requirement was redefined to include IET dropouts (reported to be 10 percent by MILPERCEN). Once the total FTG requirement was determined, the annual requirement was calculated and divided by the average population for the regiment (avg pop regt) using the equation below:

$$\text{Loss rate} = \frac{\text{RPFM FTG}}{1 - \text{IET loss}} \times \frac{1}{\text{Avg pop (regt)}} \times \frac{1}{\text{years modeled}}$$

Specifically, for the MX regiment, which was modeled for 12 years:

$$\text{Loss rate} = \frac{3,741}{1 - 0.10} \times \frac{1}{1,832} \times \frac{1}{12} = .189$$

For each rotational regiment costed, the newly computed loss rate was substituted for the individual replacement loss rate in the FORCOST Model personnel cost data base.

(4) The FORCOST Model was then executed to provide costs for each of the following type units:

- All battalion-size units manned at ALO 2 under individual replacement.

- All battalion-size units as manned by RPFM under unit rotation.

- All regiment populations as manned by RPFM under unit rotation/replacement.

For the MX regiment in particular, specific model runs were made for:

- Two MX battalions as manned at ALO 2 under individual replacement (one located in CONUS and one located in Europe).

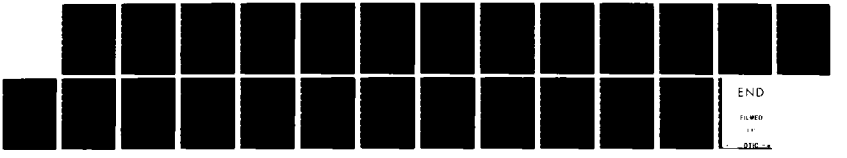
- Two MX battalions as manned by RPFM under unit rotation/ replacement (one located in CONUS and one located in Europe).

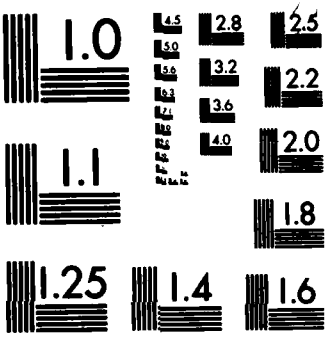
- The total regiment population located in CONUS, Europe, Korea, and Panama.

(5) The FORCOST Model provided all the data needed to cost the regiments with the exception of PCS costs. The FORCOST Model PCS cost assumes that an individual leaving a unit is replaced simultaneously. Since the logic of unit replacement does not provide replacements in either the same manner or on the same schedule as individual replacement, PCS costs for unit rotation were computed based on actual PCS data extracted from the RPFM Model using the Regimental Statistical Analysis

AD-A131 292 UNIT REPLACEMENT SYSTEM ANALYSIS I (URSA I)(U) ARMY 3/3
CONCEPTS ANALYSIS AGENCY BETHESDA MD
D R HOLDSWORTH ET AL. JAN 82 CAA-SR-82-1

UNCLASSIFIED F/G 5/9 NL





Model (RSAM) (Appendix H). Specific annual data that was extracted included the number of PCS, the number of people involved in a unit rotation, and the number of FTG and losses by OCONUS theater. Each type of data was then averaged over the 12 years for which data was reported to arrive at an "annual" approximation. Annual data collected and reduced for the MX regiment are displayed in Table L-2. Using this annual PCS data and the annual (one-way) PCS costs from the FORCOST personnel cost data base, the total PCS costs for the regiment and any subset of the regiment were computed.

Table L-2. PCS Costing Data (annual number of PCS)

Type unit	Individual replacement				Unit rotation	FTG and losses		
	CONUS	EUR	KOR	PA		EUR	KOR	PA
MX bns (2)	38	37	3	1	404[a]	191	0	0
MX regt	70	72	77	2	487[b]	236	5	0

[a]Converts to 1,212 people making a unit move once every 3 years.

[b]Includes people making unit moves in the rotating tank battalions and the Korea replacement battalions.

L-5. SENSITIVITY ANALYSIS

a. An analysis was conducted to determine the effects on total unit rotation costs of changes in the PCS cost element. This analysis was conducted since the unit rotation PCS cost element was not analyzed separately. The assumption was made that movement of individuals "en masse" would not cost more than those costs occurring with individual PCS, but could be equal to or less than individual PCS costs. Thus, unit rotation PCS costs were varied over a range using the following equation:

$$\$UR = F \times \$IR$$

where

$\$UR$ = unit rotation cost per individual PCS

$F = 1, 0.9, 0.8,$ or 0.7

$IR = individual replacement cost per individual PCS (from FCIS data base).

The lower limit of 0.7 x $IR was chosen so that the $UR costs would remain at or above the $1,458 individual PCS cost provided by the DCSPER Program and Budget Office (PBO). This lower limit was chosen because it approaches a short tour, unaccompanied PCS cost ($1,406 - Korea).

b. This analysis showed that the changes in unit rotation individual PCS cost estimates had an insignificant effect on the total 30-year costs of the regiment or its components and would not affect the choice of replacement strategies.

L-6. COST RESULTS

a. CMF 11

(1) Individual replacement and unit rotation costs for each infantry regiment were first developed for personnel (CMF 11 enlisted only) in battalion-size units. In addition, costs were developed for personnel (CMF 11 enlisted only) in the entire regiment.

(2) Table L-3 displays a summary of the input used to develop the costs for the infantry regiments and the 30-year costs for both battalion-size units and regiments. Thirty-year costs are shown because they represent the costs for the maximum time of service for personnel assigned to the regiment, i.e., a 30-year career. Data shown in Table L-3 includes the FORCOST Model input such as unit and regiment strength and actual numbers of PCS (represented as an annual number) used to calculate PCS costs. The RPFM Model was run only to portray individual replacement for the MX analysis; therefore, only FORCOST Model results are shown for the remaining regiments.

(3) The costs for the two MX battalions (only) under rotation/replacment are 10 to 12 percent greater (depending on the PCS cost assumptions) when compared with individual replacement costs from the FORCOST Model. The cost results for the two MX battalions (only) under rotation/replacement are 2 to 4 percent (depending on the PCS cost assumptions) when compared with individual replacement costs developed from RPFM results. The costs of a regiment operating under unit rotation/replacement are 22 to 23 percent greater than the costs of a regiment under individual replacement as portrayed in RPFM. These cost increases result almost solely from comparable increases in unit and regiment populations.

(4) The cost for the two motorized (Mtz) battalions under rotation/replacement are 19 to 21 percent greater (depending on the PCS cost assumptions) when compared with individual replacement costs generated from the FORCOST Model. This cost increase results from a comparable increase in the unit manning level for rotation/replacement.

Table L-3. Cost Input and Results - CMF 11 Regiments

CMF 11 units	Str	Loss rate	Annual number of PCS: Individual repl: CONUS	EUR	KOR	HI	AL	PA	Unit rotation	FTG and losses: EUR	KOR	HI	AL	PA	30-year costs (FY 81 $M): Pay and allowances	Other[a]	PCS	Total
MX regt																		
MX bns (2)																		
Indiv repl (FORCOST)[b]	1,080	0.247													$376	$198	$32	$606
Indiv repl (RPFM)	1,121	0.214	29	375	48			1		263					407	203	44	654
Unit rot ($UR = $IR)[c]	1,167	0.189	38	37	3			1	404	191					427	207	43	677
Unit rot (PBO est)	1,167	0.189	38	37	3			1	404	191					427	207	34	668
MX regt																		
Indiv repl (RPFM)	1,495	0.214	30	401	75			1		329	4				548	277	52	877
Unit rot ($UR = $IR)	1,832	0.189	70	72	77			2	487	236	5				696	330	56	1,082
Unit rot (PBO est)	1,832	0.189	70	72	77			2	487	236	5				696	330	47	1,073
Mtz regt																		
Mtz bns (2)																		
Indiv repl (FORCOST)	1,195	0.247													431	245	34	710
Unit rot ($UR = $IR)	1,458	0.211	73	16	7	6			612		22	195			517	282	58	857
Unit rot (PBO est)	1,458	0.211	73	16	7	6			612		22	195			519	282	49	848
Mtz regt																		
Unit rot ($UR = $IR)	1,851	0.211	84	39	50	15			612	26	35	199			679	355	65	1,099
Unit rot (PBO est)	1,851	0.211	84	39	50	15			612	26	35	199			679	355	56	1,090
AA regt																		
AA bns (2)																		
Indiv repl (FORCOST)	1,090	0.247													395	176	34	605
Unit rot ($UR = $IR)	1,230	0.212	40	7			2	1		236					445	226	44	715
Unit rot (PBO est)	1,230	0.212	40	7			2	1	412	236					445	226	35	706
AA regt																		
Unit rot ($UR = $IR)	1,507	0.212	46	24			12	6	412	247			5	2	558	276	48	882
Unit rot (PBO est)	1,507	0.212	46	24			12	6	412	247			5	2	558	276	39	873
Abn regt																		
Abn bns (4)																		
Indiv repl (FORCOST)	1,713	0.247													609	276	13	898
Indiv repl (RPFM)[d]	2,016	0.221	12	103						111					705	325	14	1,044
Abn regt																		
Indiv repl (RPFM)	2,766	0.221	32	149						111					988	446	18	1,452

[a]Other - includes training costs and all OMA costs.

[b]For each type regiment, loss rate, annual PCS, annual recruits, and losses were computed directly in FORCOST.

[c]Unit rotation cost equals individual replacement cost.

[d]Airborne regiment does not rotate.

(5) The costs for two air assault battalions under rotation/replacement are 17 to 18 percent greater (depending on PCS assumptions) when compared to the individual replacement costs generated by the FORCOST Model. Increases in the manning levels under rotation/replacement account for 90 to 99 percent of the cost increases over individual replacement.

(6) The units of the airborne regiment do not rotate, however all other rules of rotation/replacement apply. The costs for the four battalions in the regiment are 16 percent greater than under individual replacement cost generated by the FORCOST Model, while manning increases are 18 percent greater.

(7) Table L-4 displays the total 30-year cost for all CMF 11 regiments combined (battalion-size and whole regiments). A comparison of costs, considering battalion-size units only, shows that for all infantry regiments combined CMF 11 unit rotation costs increase approximately 14 percent over individual replacement costs.

Table L-4. CMF 11 - All Regiments, 30-year Costs

CMF 11 units	30-year Costs (FY 81 $ billions)			
	Pay and allowances	Other[a]	PCS	Total
Battalions				
Indiv repl (FORCOST)	$14.9	$7.5	$1.2	$23.6
Unit rot ($UM = $IR)[b]	17.0	8.5	1.5	27.0
Unit rot (PBO est)	17.0	8.5	1.2	26.7
Regiment				
Unit rot ($UR = $IR)	25.5	12.2	1.9	39.6
Unit rot (PBO est)	25.5	12.2	1.6	39.3

[a]Other - includes training costs and all OMA costs.

[b]Unit rotation costs equal individual replacement costs.

b. CMF 19

(1) Individual replacement and unit rotation costs for each armor regiment were first developed for personnel (CMF 19 enlisted only) in battalion-size units. In addition, costs were developed for personnel (CMF 19 enlisted only) in the entire regiment.

(2) Table L-5 displays a summary of the input used to develop the costs for the armor regiments and the 30-year costs for both battalion-size units and regiments.

(3) The costs for the two tank battalions (only) under rotation/replacement are 21 to 22 percent lower (depending on PCS assumptions) than individual replacement costs generated from the FORCOST Model. These cost decreases result from a manning level decrease of 17 percent under rotation/replacement. The manning level decreases are a result of a lower minimum manning level found in most armor units when compared to infantry or artillery.

(4) The costs for squadrons in the armored cavalry regiment under the rotation/replacment concept are 12 to 13 percent greater than the individual replacement costs developed from the FORCOST Model. There is an 8 percent personnel strength increase under unit rotation/replacement in the armored cavalry regiment squadrons.

(5) The costs for all units in the heavy cavalry regiment under unit rotation/replacement are 2 to 3 percent greater than the costs of individual replacement. The associated personnel increase for rotation/replacement is 4 percent.

(6) The armored cavalry attack brigades (ACABs) of the light cavalry regiment do not rotate although all of the other policies of rotation/replacement apply (e.g., block fill). The cost for the ACABs under individual replacement as portrayed through RPFM are 21 percent less than the individual replacement costs generated by the FORCOST Model. This cost decrease is due to a 23 percent decrease in the ACAB manning level from RPFM, again a reduced minimum manning level requirement for armor.

Table L-5. Cost Input and Results - CMF 19 Regiments

CMF 19 units	Str	Loss rate	Annual number of PCS: Indiv repl: CONUS	EUR	KOR	HI	AL	PA	Unit rotation	FTG and losses: EUR	KOR	HI	AL	PA	30-year costs (FY 81 $M): Pay and allowances	Other[a]	PCS	Total
TK regt																		
TK bns (2)																		
Indiv repl (FORCOST)[b]	484	0.247													$186	$108	$15	$309
Unit rot ($UR = $IR)[c]	400	0.173	30	13	1	3			138	55					151	77	15	243
Unit rot (PBO est)	400	0.173	30	13	1	3			138	55					151	77	12	240
Regt																		
Unit rot ($UR = $IR)	700	0.173	47	40	25	6			192	75	1	3			270	135	23	428
Unit rot (PBO est)															270	135	19	424
Armd cav regt																		
Sqdn[d]																		
Indiv repl (FORCOST)	936	0.247							339	152					350	174	29	553
Unit rot ($UR = $IR)	1,014	0.176	66	137					339	152					386	196	43	625
Unit rot (PBO est)	1,014	0.176	66	137					339	152					386	196	35	617
Regt																		
Unit rot ($UR = $IR)	1,191	0.176	67	141					339	170					466	236	45	747
Unit rot (PBO est)	1,191	0.176	67	141					339	170					466	236	37	739
Hv div cav regt																		
ACAB[e]																		
Indiv repl (FORCOST)	1,012	0.247													376	216	32	624
Unit rot ($UR = $IR)	1,057	0.193	14	195	11			2	180	173	1				397	206	37	640
Unit rot (PBO est)	1,057	0.193	14	195	11			2	180	173	1				397	206	33	636
Regt																		
Unit rot ($UR = $IR)	1,397	0.193	19	211	30			3	180	187	6			2	531	270	40	841
Unit rot (PBO est)	1,397	0.193	19	211	30			3	180	187	6			2	531	270	36	837
Lt div cav regt																		
ACAB																		
Indiv repl (FORCOST)	1,276	0.247													460	280	28	768
Indiv repl (RPFM)[f]	982	0.307	6		400						156				352	230	24	606
Regt																		
Indiv repl (RPFM)	1,418	0.307	6		456						224				512	332	29	873

[a]Other - includes training costs and all OMA costs.

[b]For each type regiment, loss rate, annual PCS, annual recruits, and losses were computed directly in FORCOST.

[c]Unit move cost equals individual replacement cost.

[d]All squadrons in regiment.

[e]All units - MX/TK component plus ACAB, ACAB does not rotate.

[f]Light division cavalry regiment does not rotate.

(7) Table L-6 displays the total 30-year cost for all CMF 19 units combined (battalion-size and whole regiments). A comparison of costs, considering battalion-size or equivalent units only, shows that for all armor regiments combined, unit rotation costs decrease 12 percent. This decrease in costs results from a commensurate decrease in personnel from ALO 2.

Table L-6. CMF 19 - All Regiments, 30-year Costs

CMF 19 units	30-year Costs (FY 81 $ billions)			
	Pay and allowances	Other[a]	PCS	Total
Battalion				
Indiv repl (FORCOST)	$7.8	$4.6	$0.6	$13.0
Unit rot ($UR = $IR)	7.1	3.7	0.7	11.5
Unit rot (PBO est)	7.1	3.7	0.6	11.4
Regiment				
Unit rot ($UR = $IR)	11.0	5.6	0.9	17.5
Unit rot (PBO est)	11.0	5.6	0.8	17.4

[a]Other - includes training costs and all OMA costs.

[b]Unit rotation costs equal individual replacement costs.

c. CMF 13

(1) Individual replacement and unit rotation costs for each artillery regiment were first developed for personnel (CMF 13 enlisted only) in battalion-size units. In addition, costs were developed for personnel (CMF 13 enlisted only) in the entire regiment.

(2) Table L-7 displays a summary of the input used to develop the costs for the artillery regiments and the 30-year costs for both battalion-size units and regiments.

Table L-7. Cost Input and Results - CMF 13 Regiments
(page 1 of 2 pages)

CMF 13 units	Str	Loss rate	Annual number of PCS												30-year costs (FY 81 $M)			
			Indiv repl						Unit rotation	FTG and losses					Pay and allowances	Other[a]	PCS	Total
			CONUS	EUR	KOR	HI	AL	PA		EUR	KOR	HI	AL	PA				
155 SP regt																		
155 SP bns (2)																		
Indiv repl (FORCOST)[b]	998	0.247													$352	$194	$31	$577
Unit rot ($UR = $IR)[c]	1,103	0.212	17	23	1				379	242					378	202	42	622
Unit rot (PBO est)	1,103	0.212	17	23	1				379	242					378	202	34	614
Regt																		
Unit rot ($UR = $IR)	1,573	0.212	22	62	30				404	277	5				561	287	51	899
Unit rot (PBO est)	1,573	0.212	22	62	30				404	277	5				561	287	43	891
105 T regt (101st)																		
105 T bns (2)																		
Indiv repl (FORCOST)	624	0.247																
Unit rot ($UR = $IR)	683	0.202	54	30			14		231				117		237	122	25	384
Unit rot (PBO est)	683	0.202	54	30			14		231				117		258	124	37	419
Regt															258	124	26	408
Unit rot ($UR = $IR)	2,125	0.202	113	282			16	17	231	211			117	19	784	380	72	1,236
Unit rot (PBO est)	2,125	0.202	113	282			16	17	231	211			117	19	784	380	61	1,225
105 T regt (Bragg)																		
105 T bns (3)																		
Indiv repl (FORCOST)	900	0.247													319	149	2	470
Indiv repl (RPFM)[d]	763	0.207	117					28							262	117	6	385
Regt																		
Indiv repl (RPFM)	1,074	0.207	122					32						8	382	170	7	559
155 T regt (C-H)[e]																		
155 T bns (2)																		
Indiv repl (FORCOST)	966	0.247																
Unit rot ($UR = $IR)	983	0.228	39	14		14			323			200			343	206	34	583
Unit rot (PBO est)	983	0.228	39	14		14			323			200			338	201	51	590
Regt															338	201	36	575
Unit rot ($UR = $IR)	1,636	0.228	56	110		27			323	87		211			577	322	66	965
Unit rot (PBO est)	1,636	0.228	56	110		27			323	87		271			577	322	51	950
155 T regt (C-K)[f]																		
155 T bns (3)																		
Indiv repl (FORCOST)	1,449	0.247																
Unit rot ($UR = $IR)[g]	1,587	0.232	62	38	25				1,119		87				503	298	35	836
Regt															536	322	56	914
Unit rot ($UR = $IR)	2,677	0.232	71	215	57				1,119	169	101				923	521	81	1,525

Table L-7. Cost Input and Results - CMF 13 Regiments
(page 2 of 2 pages)

CMF 13 units	Str	Loss rate	Annual number of PCS												30-year costs (FY 81 $M)			
			Indiv repl						Unit rotation	FTG and losses					Pay and allowances	Other[a]	PCS	Total
			CONUS	EUR	KOR	HI	AL	PA		EUR	KOR	HI	AL	PA				
8"/MLRS regt (C-H)																		
8"/MLRS bns (2)																		
Indiv repl (FORCOST)	984	0.247													$345	$206	$35	$586
Unit rot ($UR = $IR)	1,135	0.217	28	23	4	10			387			231			394	229	60	683
Unit rot (PBO est)	1,135	0.217	28	23	4	10			387			231			394	229	41	664
Regt																		
Unit rot ($UR = $IR)	2,131	0.217	80	124	100	12			488	57	3	233			758	409	80	1,247
Unit rot (PBO est)	2,131	0.217	80	124	100	12			488	57	3	233			758	409	61	1,228
8"/MLRS regt (C-E)[h]																		
8"/MLRS bns (2)																		
Indiv repl (FORCOST)	984	0.247													342	188	31	561
Unit rot ($UR = $IR)	1,134	0.218	29	34	4	2			389	232					390	207	44	641
Unit rot (PBO est)	1,134	0.218	29	34	4	2			389	232					390	207	35	632
Regt																		
Unit rot ($UR = $IR)	2,130	0.218	73	117	92	2			489	290	25	4			754	388	64	1,206
Unit rot (PBO est)	2,130	0.218	73	117	92	2			489	290	25	4			754	388	55	1,197
8" SP Regt																		
8" SP bns (2)																		
Indiv repl (FORCOST)	448	0.247													161	89	14	264
Unit rot ($UR = $IR)	522	0.201	16	24					178	80					185	96	20	301
Unit rot (PBO est)	522	0.201	16	24					178	80					185	96	16	297
Regt																		
Unit rot ($UR = $IR)	727	0.201	18	54					178	131					268	135	25	428
Unit rot (PBO est)	727	0.201	18	54					178	131					268	135	21	424

[a]Other - includes training costs and all OMA costs.

[b]For each type regiment, loss rate, annual PCS, annual recruits, and losses were computed directly in FORCOST.

[c]Unit rotation cost equal individual replacement costs.

[d]105 T regiment (Bragg) does not rotate.

[e]CONUS - Hawaii rotation.

[f]CONUS - Korea rotation.

[g]Unit rotation cost equals individual replacement cost for Korea.

[h]CONUS - Europe rotation.

(3) The costs for the two 155 SP artillery battalions under unit rotation/replacement are 6 to 8 percent greater than individual replacement costs generated by the FORCOST Model. These cost increases result almost solely from an 11 percent personnel manning increase under unit rotation/replacement.

(4) The costs for two 105 T artillery battalions under unit rotation/replacment are 0 to 9 percent greater than individual replacement costs. This cost increase is due almost solely to a 9 percent personnel manning increase under rotation/replacement.

(5) The battalions of the 105 T artillery regiment at FT Bragg do not rotate; therefore, as in the cases of the light cavalry regiment and the airborne regiment, the RPFM Model represented individual replacement for this regiment. The costs of the three battalions using RPFM generated data are 18 percent less than the costs of three battalions generated through the FORCOST Model. This cost decrease is due to a 15 percent personnel strength decrease in the RPFM results as compared to ALO 2 authorizations.

(6) The costs of two 155 T battalions on a CONUS to Hawaii rotation are approximately equivalent to the individual replacement costs from the FORCOST Model, with a 2 percent personnel increase from ALO 2.

(7) The costs of three 155 T battalions on a CONUS to Korea rotation are 10 percent greater than the individual replacement costs for the same units. A commensurate personnel increase in the rotating units exists. For this regiment, the unit move PCS cost was assumed to equal the individual PCS cost. The PBO estimate was not used since it was higher than the individual PCS cost.

(8) The costs for two 8-in MLRS battalions on a CONUS-Hawaii rotation are 13 to 17 percent greater than individual replacement costs for the same units. This cost increase is essentially the result of a 15 percent personnel strength increase under rotation/replacement.

(9) The costs for two 8-in MLRS battalions on a CONUS-Europe rotation are 13 to 14 percent greater than individual replacement costs for the same units. This cost increase is due primarily to a 15 percent personnel strength increase under rotation/replacement.

(10) The costs of two 8-in SP battalions under rotation/replacement are 13 to 14 percent greater than individual replacement costs for these same units. The cost increase results primarily from a 17 percent personnel increase under rotation/replacement.

(11) Table L-8 displays the total 30-year cost for all CMF 13 units combined (battalion-size and whole regiments). A comparison of costs, considering battalion-size units only, shows that for all artillery regiments CMF 13 unit rotation costs increase 8 percent with a commensurate increase in personnel levels.

Table L-8. CMF 13 - All Regiments, 30-year Costs

CMF 13 units	30-year Costs (FY 81 $ billions)			
	Pay and allowances	Other[a]	PCS	Total
Battalions				
Indiv repl (FORCOST)	$11.1	$6.2	$1.0	$18.3
Unit rot ($UR = $IR)	12.0	6.5	1.4	19.9
Unit rot (PBO est)	12.0	6.5	1.1	19.6
Regiment				
Unit rot ($UR = $IR)	19.4	10.1	1.7	31.2
Unit rot (PBO est)	19.4	10.1	1.5	31.0

[a]Other - includes training costs and all OMA costs.

[b]Unit rotation costs equal individual replacement costs.

L-7. OBSERVATIONS

a. On the average, PCS costs comprise 5 percent of the total personnel costs for a regiment. The remaining 95 percent are attributable to pay and allowances, training, and all OMA costs.

b. A comparison of costs, considering battalion-size units only, shows that for all regiments combined:

(1) CMF 11 unit rotation costs increase 14 percent over individual replacement costs.

(2) CMF 19 costs decrease 12 percent.

(3) CMF 13 costs increase 8 percent.

c. The increased manning levels required to support/sustain the rotational concept are the major contributor to the cost increases as compared to the individual replacement concept.

d. The decrease in CMF 19 costs is due to the reduced manning/authorization requirements for armor-type units. If these requirements had been similar to those of infantry and artillery units, comparable increases in cost would have been noted.

e. The number of PCS increased under unit rotation. PCS costs increased over a range of 4 to 29 percent depending on the PCS cost assumptions. The PCS cost increase did not contribute significantly to the total costs.

APPENDIX M

CONUS-OCONUS ROTATIONAL UNIT DISTRIBUTIONS

M-1. INTRODUCTION. This appendix summarizes the results of the initial macroanalysis to determine the number of rotational units and the type of rotational patterns that should be modeled in the study. It also displays the methodology used to allocate and align CONUS-OCONUS rotational units. The insights from this analysis were provided to the Manning Task Force soon after the Regimental Concept Paper was published. These insights formed the basis for the decision to analyze a concept requiring paired and matched rotational battalions and to link MX and TK battalions for assignment of 11C personnel to the mortar platoons of each. This analysis was based upon the Active Army Division 86 MX and TK battalions, by their projected geographic locations, in the steady state years (assumed to be sometime after 1986). To preclude discussion of classified material, actual unit designations and geographic locations will not be included (the composition of the heavy divisions under Division 86 is not classified). The numbers of units reflect the extraction of Reserve Component round-out units and include CONUS battalions not located at a heavy division installation.

M-2. UNIT ALLOCATION METHODOLOGY. The following paragraphs describe the details of allocating CONUS rotational units to support OCONUS requirements for both a balanced and imbalanced case. An imbalanced case is one in which all OCONUS rotational requirements cannot be supported by the proposed CONUS allocation. In general, the process is iterative with the following steps (refer to Figure M-2):

- Step 1 - For a given type battalion (e.g., tk, etc.) form a matrix showing:
  - OCONUS locations (top margin in Figure M-1).
  - OCONUS requirements - number of battalions/tour lengths for each location. When forming this ratio, the requirements for a short tour area must be tripled to ensure a 3-year CONUS tour for the supporting battalions (e.g., a two-battalion requirement in a short tour OCONUS location (2/1) equates to a 6/3 CONUS rotational requirement unless replacement (provisional) units are formed (as in Figure M-2) with other 3-year cycles (bottom margin in Figure M-1).
  - CONUS locations (left margin in Figure M-1).
  - CONUS units available at each location (left margin in Figure M-1).

CONUS locations	Units per location
A(-)	3
B(-)	2
I	4
J	3
K	4
L	4
M	2
N	1
Total	23

OCONUS locations

	A[a]	B[a]	C	D	E	F	G	H
	$^{2}/_{3}$		$^{1}/_{t_1}{}^{c}$					
		$^{2}/_{3}$						
			$^{2}/_{t_1}{}^{c}$	$^{2}/_{t_2}{}^{c}$				
				$^{1}/_{t_2}{}^{c}$	$^{2}/_{t_3}{}^{c}$			
					$^{2}/_{t_3}{}^{c}$	$^{2}/_{t_4}{}^{c}$		
						$^{2}/_{t_4}{}^{c}$		$^{2}/_{t_5}{}^{c}$
								$^{2}/_{t_5}{}^{c}$
							$^{1}/_{3}$	
	$^{2}/_{3}$	$^{2}/_{3}$	$^{4}/_{3}$	$^{4}/_{3}$	$^{5}/_{3}$	$^{5}/_{3}$	$^{1}/_{3}$	$^{6}{}^{d}/_{3}$

Reqd OCONUS units $(29)/_{\text{OCONUS tour length}}$

---

[a] Forward deployed subordinate element.

[b] Entries are number of CONUS units by CONUS tour length.

[c] $t_1 = t_2 = \frac{3(3)}{4} = 2.25$ yrs; $t_3 = t_4 = \frac{4(3)}{5} = 2.4$ yrs; $t_5 = {}^{4}/_{2} = 2$ yrs.

[d] $^{6}/_{3} = {}^{2}/_{1}$ for OCONUS short tour requirement equivalent.

Figure M-1. Unit Allocation Matrix for Division 86 Battalions (imbalanced unit ratio)

CONUS locations	Units per location
A(-)	3
B(-)	2
I	4
J	3
K	4
L	4
M	2
N	1
O	2[c]
Total	25

OCONUS locations

A[a]	B[a]	C	D	E	F	G	H
2/3			1/3				
	2/3						
		4/3					
			3/3				
				4/3			
					4/3		
				1/3	1/3		
						1/3	
							2/1
2/3	2/3	4/3	4/3	5/3	5/3	1/3	2[c]/1

Reqd OCONUS units (25)/OCONUS tour length

[a] Forward deployed subordinate element.

[b] Entries are number of CONUS units by CONUS tour length.

[c] Provisional replacement battalions on 2-year CONUS-OCONUS cycles.

Figure M-2. Unit Allocation Matrix for Division 86 Battalions (balanced unit ratio)

- Step 2 - Working from the upper left of the matrix, allocate the available CONUS units to the OCONUS locations attempting to meet the OCONUS requirements for numbers of battalions.

- Step 3 - Determine the CONUS tour lengths to support the OCONUS requirements. If the vertical sums of CONUS available units equals the OCONUS requirements, then each CONUS unit will have a 3-year tour length and the process is complete (balanced case). If the vertical sums do not equal the requirements (imbalanced case), either the force structure must be changed or the CONUS tour lengths must be adjusted (to be other than the desired 3-year length) using the following ratio:

$$\frac{\text{CONUS units}}{\text{CONUS tour length}} = \frac{\text{OCONUS units}}{\text{OCONUS tour length}}$$

- Step 4 - Repeat Steps 2 and 3 until a feasible solution is determined. As explained in paragraph a(2) below, an imbalanced case results in an infeasible solution and force structure changes (e.g., the forming of additional CONUS units) will be required.

a. CONUS-OCONUS Imbalance of Units

(1) Figure M-1 shows an allocation matrix into which a sample allocation of MX battalions has been placed in such a way that all MX battalions (minus two that cannot feasibly be rotated) may be rotated. The conditions to be satisfied are that the number of units by geographic location must remain constant and the OCONUS tour lengths are 3 years in long tour areas and 1 year in the short tour areas. The numbers in the cells of the figure are the ratios: numbers of CONUS units/CONUS tour length for each. These ratios are calculated such that the ratios may be summed vertically to satisfy the ratios along the bottom margin of the matrix (the OCONUS requirement for units/specified OCONUS tour lengths). Similarly, the numerators (always whole numbers) of the ratios may be summed horizontally to equal the number of available CONUS battalions by location and (along the bottom margin) total (adjusted) OCONUS requirements. The number of CONUS units needed to support a battalion in short tour areas is 3, since each unit is to have a 3-year CONUS tour. Where the numbers of allocated battalions do not sum equally to satisfy both the CONUS availability and the OCONUS requirement (imbalanced ratio), the length of the CONUS tour cannot equal the length of the OCONUS tour. In this case, the resultant length of the CONUS tour is calculated by inserting a variable in the denominator(t_n), summing the ratios vertically, setting them equal to the required OCONUS ratio, and solving for the denominators.

For example, the required CONUS tour length to support the OCONUS requirements at location C (in Figure M-1) would be calculated as shown below:

$$\frac{1}{t_1} + \frac{2}{t_1} = \frac{4}{3},$$

and solving for t_1;

$$t_1 = 2.25 \text{ years.}$$

Thus, to meet the OCONUS requirements (four battalions with 3-year tours at location C) with the available CONUS battalions allocated as shown, a CONUS tour length for these battalions would average only 2.25 years.

(2) This rotational allocation is only one of many, but it serves to demonstrate the result of attempting to rotate units under an imbalanced CONUS-OCONUS situation. Regimental affiliation and homebasing cannot be maintained for all battalions. Although a fractional number of years can be calculated for the CONUS tour, physically a 2.25-year tour means three out of four CONUS tours will be 2 years long, while the fourth will be 3 years in length. Consequently, a unit starting at homebase I and deploying to OCONUS location C, may well find itself unable to return to I, going to A (-) instead (given the CONUS stationing requirements remain fixed). On the unit's next OCONUS deployment it could well go to A (forward), if it is next in the order of units to go. Several unfavorable situations are therefore suggested by such an allocation, not the least of which is lack of equitability of CONUS tours for all units.

(3) Attempting to allocate the available 23 MX battalions to support the required 29 OCONUS battalions results in a very complex, essentially unmanageable situation, with no flexibility in unit movements. Any disruption of the process, such as a medium duration contingency force deployment, would seriously affect the entire rotatational scheme and all internal manning actions.

b. Balanced Number of CONUS-OCONUS Units

(1) Figure M-2 shows an allocation matrix that satisfies the marginal conditions, maintains regimental affiliation and homebasing, and reduces the impact of interruptions in any portion of the rotational/replacement patterns.

(2) The difference between the allocations in Figures M-1 and M-2 is that provisional replacement units have been added to the force structure. The replacement units are formed and trained at installation Q (or any other available post) and are composed of careerists (extra-regimentally assigned for 2 years from all the MX regiments) and COHORT-type packages of first-termers who serve the first 2 years of their enlistment in the replacement unit and the last year (after returning from the OCONUS short tour area) in the MX regiment of their choice.

(3) This allocation leaves 46 MX battalions, evenly split between CONUS and OCONUS, that can be grouped into regiments. Because of matching and pairing requirements, each regiment must contain an even number of battalions, with the maximum number of battalions per regiment being twice the number of battalions stationed at any one CONUS installation. As indicated in Chapter 5, the MX regiment analysis was based on an assumed 23 MX regiments of two battalions each.

c. Linking of Battalions. A similar allocation of tk battalions was performed and it was determined that MX and tk battalions from the same CONUS installation could generally be rotated in such a way that the fill of MOS 11C personnel in the mortar platoon of the tk battalion could be incorporated into the MX battalion rotational concept. This served to guarantee homebasing and career progression for these personnel by considering them to be extraregimentally assigned from the MX regiment to its linked tk regiment from the same CONUS homebase.

d. Other Unit Groupings. A similar macroanalysis was performed for the other combat arms regiments and was an important step in the stylization process described in Chapter 5.

GLOSSARY AND DEFINITIONS

1. ABBREVIATIONS, ACRONYMS, AND SHORT TERMS

AA	air assault
abn	airborne
AC	armored cavalry
ACMIP	Automated Force and Materiel Cost Methodology Project
ACR	armored cavalry regiment
ADP	automated data processing
AFPCH	Army Force Planning Cost Handbook
ALO	authorized level of organization
ARCOST	Army Cohesion and Stability Study
ASCII	American Standard Code for Information Interchange
AURS	Automated Unit Reference Sheets
CAA	US Army Concepts Analysis Agency
CMF	career management field
COA	Comptroller of the Army
COHORT	cohesion, operational readiness, and training
CONUS	continental United States
CPU	central processing unit
C-REP	company replacement package
CSA	Chief of Staff, Army
DA	Department of the Army
DCSOPS	Deputy Chief of Staff for Operations and Plans
DCSPER	Deputy Chief of Staff for Personnel

EAB	Echelon Above Battalion
EEA	essential element(s) of analysis
ERA	extraregimental assignment
FCIS	Force Cost Information System
FORCOST	Force Cost Model
FORSCOM	US Army Forces Command
FORTRAN	formula translator
FTG	first-term group
HC	heavy division cavalry
HQDA	Headquarters, Department of the Army
IET	initial entry training
IPR	in-process review
LC	light division cavalry
LIN	line item number (equipment)
MACOM	major Army command
mech	mechanized
MLRS	multiple launch rocket system
MOC	measure of cost
MOE	measure of effectiveness
MOS	military occupational specialty
MTF	Manning Task Force
MTOE	Modified Table(s) of Organization and Equipment
mtz	motorized infantry
Mx	Mechanized Infantry
NMS	New Manning System

NCO	noncommissioned officer
OCONUS	outside continental United States
ODCSPER	Office of the Deputy Chief of Staff for Personnel
OMA	Operation and Maintenance, Army
PA	Panama
PCS	permanent change of station
PERSEM	Personnel Evaluation Model
POM	Program Objective Memorandum
RPFM	Regimental Personnel Flow Model
RSAM	Regimental Statistical Analysis Model
SAG	study advisory group
SP	self-propelled
SPSS	Statistical Package for the Social Sciences
SRC	standard requirement code
TAADS	The Army Authorization Document System
TDA	Table(s) of Distribution and Allowances
TIG	The Inspector General time in grade
TIS	time in service
tk	tank
TOE	Tables of Organization and Equipment
TPIG	Division 86 Transition, Planning, and Implementation Group
TRADOC	US Army Training and Doctrine Command
TRB	Technical Review Board
URSA	Unit Replacement System Analysis

URSAM	Unit Rotation/Replacement System Analysis Model
USACAA	US Army Concepts Analysis Agency
USAMSSA	US Army Management System Support Agency
USAREC	US Army Recruiting Command
ZLIN	developmental equipment line item number

2. DEFINITIONS

Assignment window	That period of time in which soldiers are allowed to enter and leave a unit (examples: postdeployment window, predeployment window, FTG fill window).
Authorized Level of Organization	The ratio of authorized spaces to full TOE spaces. ALO 1 is equivalent to 100 percent of TOE spaces. ALO zoned 2 and 3 are defined in Table 5-2 of this report.
Careerists	Those individuals who have completed their first-term enlistment period and have reenlisted.
Careerist opt-out window	See postdeployment and predeployment window.
Dynamic fill	FTG fill calculated so that FTG strength will not drop below a specified minimum before the next fill window.
First-term group (FTG)	Consists of those individuals who have completed their initial entry training but have not completed their first enlistment period.
FTG fill	The introduction of FTG into a unit, usually "en masse."
FTG fill window	That period of time in the unit rotation cycle when the FTG block fill of the unit occurs.
Homebasing	The permanent location of the regimental colors, in CONUS. A CONUS installation to which career soldiers in the system are assigned whenever possible.

Individual replacement	The introduction of personnel into the unit on a singular basis (i.e., one soldier leaves unit and is replaced by another soldier).
Initial entry training (IET)	Soldier training consisting of basic and advanced individual training (the time of which is MOS dependent). This training is completed prior to the arrival of the soldier at his initial assignment.
Postdeployment window	That period of time when careerists are allowed to enter and leave the rotating unit immediately following its return from OCONUS.
Predeployment window	That period of time 6 months prior to a unit's OCONUS deployment in which limited reassignment of careerists is made to prepare the unit for overseas deployment.
Regiment	A regiment is the grouping of two or more similar units (example--battalions) organized under regimental colors and having an established homebase.
Regimental affiliation	The continuous association or identification of a soldier with a single regiment, unit, or institution throughout his career.
Regimental system	For the URSA I Study, the regimental system is defined as a grouping of similar, rotating battalions organized under regimental colors, having a CONUS homebase.
Rotation concept	A scheme for the orderly, cyclical movement of battalion size units.
Rotation system	See rotation concept.
Stability	Stability is keeping soldiers together in units longer, measured by a soldier's tenure in his unit rather than his tour length at a location.
Stabilization	See stability.
Stabilized unit	A unit in which personnel are allowed assignment/reassignment only at prescribed periods of time.

Steady state	The steady state for a unit replacement/rotation system is the eventual condition which occurs, and can be sustained, after the start-up or transition phase is complete. The steady state is exemplified by a smooth rotation of units between CONUS and OCONUS stations supported by a personnel system which provides a sufficient supply of trained individuals.
Stylization	An analytic technique to develop a representative sample, the analysis of which can be extrapolated to the population of which the sample is representive.
Trickle fill	FTG block fill only to ALO 1 with individual replacement used to replenish ERA pool strengths whenever these strengths fall below ALO 3.
Unit movement	See unit rotation.
Unit replacement	To disestablish a unit at the end of a tour and replace it with a newly formed and deployed unit as opposed to rotating old and new units.
Unit rotation	The movement of units from a CONUS homebase to OCONUS and back.